THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS REVIEW, COPPER AND BRASS
A TRADE JOURNAL RELATING TO METALS AND ALLOYS

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THE CHICAGO CONVENTION

A BRIEF REPORT OF THE PROCEEDINGS OF THE FOUNDRYMEN'S ASSOCIATIONS ASSEMBLED IN CONVENTION AT CHICAGO, ILL., OCTOBER 14 TO 17, 1913, AND INCLUDING A DESCRIPTION OF THE EXHIBITION HELD AT THE SAME TIME BY THE FOUNDRY AND MACHINE EXHIBITION COMPANY.

The 1913 convention of foundrymen opened in Chicago, Ill., on Tuesday, October 14, with a joint meeting at the Hotel La Salle of the American Foundrymen's Association and the American Institute of Metals. At this meeting H. D. Miles, Buffalo Foundry & Machine Company, Buffalo, president of the former association, presided. He introduced Charles A. Plamondon, of Chicago, chairman of the local convention committee, who presided during the greater part of the session. In the absence of Mayor Carter Harrison, William H. Sexton, the corporation counsel, extended a welcome on behalf of the city. An address of welcome on behalf of the business interests of Chicago was made by E. C. Ferguson, of the Chicago Association of Commerce. Chairman Plamondon extended thanks to the various committees for their work in arranging the convention details, and brief remarks were made by O. J. Abell, chairman of the Publicity committee. President Miles again took the chair and called upon Alfred E. Howell, Phillips & Buttorff Mfg. Company, Nashville, Tenn., vice-president, who responded to the address of welcome made by the Chicago speakers.

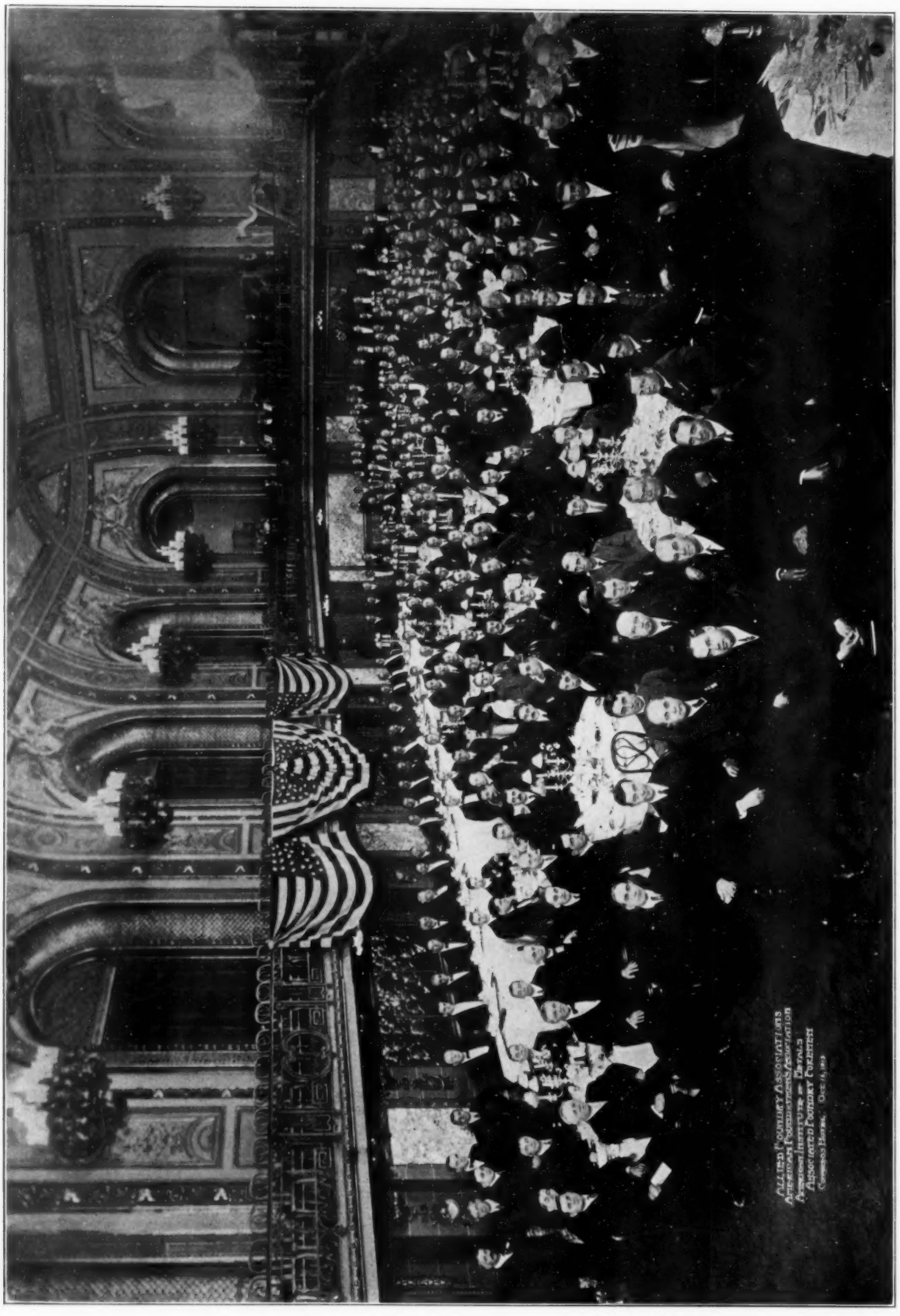
SOME EMBLEMS OF REPRESENTATION.

After the speeches the reports of secretaries and treasurers were read. The report of Secretary-Treasurer W. M. Corse, of the American Institute of Metals, follows:

Our membership this year has shown a disposition to mark time, which I believe is in line with the general industrial condition. On July 1, 1912, we reported 310 members. On July 1, 1913, 274. This is accounted for by the fact that the usual number of people dropping out, non-payment of dues, etc., were not replaced by new memberships. At the present time we have a membership of 277.

I believe the most important work undertaken during the year has been the co-operative work in connection with the Bureau of Standards and the Bureau of Mines at Washington. Both of these bureaus have been doing splendid work in connection with subjects that interest us particularly, and it is with great interest that we shall hear the reports of the committees which co-operate with them, also the statements from the officials of the government bureaus themselves. It seems to me that this kind of work will do more to benefit our membership at large than almost anything that we could undertake. The testing out of the various kinds of furnaces, for instance, which has been undertaken by the Bureau of Mines, is an extremely valuable piece of research. The standardization of the test bars, which all of us use, undertaken by the Bureau of Standards, is also a great step in advance, for when this is decided, the determination of the properties of the various alloys will become much simpler. It has been suggested that our committee, which is co-operating with the Bureau of Standards, form part of a general advisory committee for this same purpose, this larger committee to be composed of our members, those from the American Society for Testing Materials, the American Chemical Society and the American Institute of Mining Engineers.

Our bound volume, which was issued recently, is one of the best contributions to the literature of non-ferrous metallurgy



THE ANNUAL BANQUET OF THE ALLIED FOUNDRY ASSOCIATIONS HELD IN THE CONGRESS HOTEL, OCTOBER 16, 1913, AT CHICAGO, ILL.

that has so far been issued by our Institute. It is over double the size of our former volumes and contains much more items of interest than usual. For instance, the bulletins which appear from time to time will be found in the back of the volume, together with the list of members and officials of the society.

In looking forward to the present convention, it gives me great pleasure to add my word of appreciation to the work done by the Papers Committee, of which Dr. H. W. Gillett is chairman. I think you will agree with me that the programme this year is an unusually strong one. We thought last year that our programme was good, but this looks as though it would be better. Let us hope that the discussions on these various papers will be of even more interest than those in former meetings.

The financial report of the Institute is as follows:

RECEIPTS.

On hand, July 1, 1912	$ 81.00	
Dues	1,370.00	
Volumes	252.00	
Foundry and machine exhibition Co. con.	250.00	
Interest	16.00	
		$1,969.50

DISBURSEMENTS.

Postage	$ 73.00	
Printing transactions	546.93	
Printing bulletins	202.20	
Office supplies	95.93	
Salary	700.00	
Express and telegrams	10.15	
Treasurer's bond	5.00	
Debit memos.	24.00	
Institute of Metals	10.65	
Stenographer at Buffalo	201.00	
Exchange	12.40	
American Chemical Society Abstracts	6.00	
Delegate Exp. Int. Ass'n. Testing Materials	10.00	
		$1,897.26
On hand, July 1, 1913		$ 72.24

REPORT OF OFFICIAL CHEMIST.

The first paper presented at Wednesday's meeting was the report of the official chemist, written by C. F. Woods, of Arthur T. Little, Boston, Mass. The report stated that not so many new processes and inventions had been developed last year as in previous years. One of the principal points brought out in the paper was the fact that increase of consumption and decrease of production in some certain lines had given rise to a situation that called more strongly than ever for conservation of resources, the elimination of wastes, and the application of new processes and materials. In this connection the writer said that there is shown a growing appreciation of the importance of the connection of technical knowledge with manufacturing conditions. The metal industries show this change in the patenting of many new combinations of materials and the utilization of rare metals which had heretofore been considered as only scientific curiosities. Among these latter is the introduction of the use of boronized copper as described in THE METAL INDUSTRY, November, 1912, and February, 1913.

Other new metals or combinations are mentioned in the report, one of which is a new white metal alloy patented in England and composed of copper, nickel, iron and aluminum. The chief feature of this alloy is that it contains 50 per cent. of iron. On discussing the alloy few members seemed to be acquainted with it and President Olson thought that the presence of so much iron would make the metal a hard proposition to work. McAdamite, an aluminum alloy of high tensile and compression strength, came in for considerable attention, and E. B. Home, of the Packard Motor Car Company, of Detroit, Mich., gave some interesting data relating to his attempts to use the metal for transmission cases. He finally overcame the shrinkage to which alloys of aluminum are subject by a system of chilling. McAdamite was described in THE METAL INDUSTRY, June, 1913. The chemist's report closed with an optimistic view of conditions in general and a hope that the present year will prove productive of many new things in the metal industries.

Dr. D. K. Burgess read a paper describing the work of the Bureau of Standards, which was fully illustrated with lantern slides and proved to be very interesting. This paper is published in this issue of THE METAL INDUSTRY. Dr. Burgess was also author of a paper (also published in this issue) on the "Nomenclature of the Non-Ferrous Metals," which aroused considerable discussion. This paper was followed by one on the same subject by C. R. Karr, of the Bureau of Standards, which ended with a suggested scheme of classification. The discussion which followed this paper brought out some interesting points which at present seem to present a difficult problem to solve. Dr. H. W. Gillet, of the Bureau of Mines, said that there is some excuse for some of the names of metals and alloys that have now strong commercial standing, and he thought the Institute should go slow in advocating the entire abandonment of the present nomenclature. He suggested that the Bureau of Standards take up the matter and prepare an official list designating alloys by number and also giving the popular names. Mr. Karr said that he thought the Bureau of Standards would hesitate to establish a precedent and suggested that manufacturers take up the subject with the Bureau. The matter was finally referred to the Advisory Committee to work in conjunction with the Bureau of Standards and report at next meeting. Mr. Karr then read a paper in "The Brass Foundry of the Future," which is published elsewhere in this issue of THE METAL INDUSTRY.

Prof. G. L. Parsons, of the Bureau of Mines, made a brief report of the work done by the Bureau in cooperation with the American Institute of Metals. The report is published in the Association and Societies columns of this issue of THE METAL INDUSTRY.

In answering a question by a member about pyrometers Dr. Gillet, who read Prof. Parsons' report, stated that the temperature of brass can now be measured cheaply, but not accurately, as it required expensive equipment to measure it accurately.

SCIENTIFIC MANAGEMENT.

The session held Thursday morning developed some very interesting discussion regarding scientific management in the foundry. Three papers were read covering the subject. These were "The Efficiency Engineer in the Foundry," by E. A. Barnes, general superintendent of the Fort Wayne Electric Works of the General Electric Company; "Preparations for Scientific Management in Our Plant," by Secretary W. M. Corse, and "How Scientific Management Works in Our Plant," by C. B. Bohn, general superintendent of the Aluminum Castings Company. Mr. Barnes was of the opinion that no set rules could be laid down to govern any considerable proportion of foundries, and for this reason he did not believe the introduction of motion study or efficiency engineering would be practical in many small foundries, but in spite of this he said there is room for improvement in the methods used in all foundries. He advocated the plan of developing a man from within the organization rather than to go outside for one who is not familiar with existing conditions. In order to obtain good results from labor saving devices it is necessary that these devices be individually fitted to the particular shop in which they are installed. The value of the efficiency engineer enters here, for he can decide the important question of securing the most effi-

Officers of American Institute of Metals, 1913-1914

WM. M. CORSE,
Secretary-Treasurer.

G. H. CLAMER,
President.

FRED. MOERL,
Vice-President for Chicago and Wisconsin.

ROBERT JOB,
Vice-President for Quebec and Maritime Provinces.

PHILIP MUELLER,
Vice-President for Illinois, except Chicago District.

JESSE L. JONES,
Vice-President for Pennsylvania.

E. S. FRETZ,
Vice-President for Virginia and the South.

F. O. CLEMENTS,
Vice-President for Michigan and Ohio.

cient devices. After he has applied his scientific knowledge and experience in eliminating all lost motion and other wastes in the operation of a business, his time can be devoted to the study of cost reduction. Mr. Corse said he believed that conditions in the plant must be standardized so that the proper methods of piece work, premium plan or bonus system can be installed before scientific management could be introduced. It seemed to him that the foundry problem is one of motions and the foundry should study these motions scientifically; much more so than some other kinds of business. Mr. Bohn said that before he investigated scientific management he believed that it would work out well in every business but his own. After he had finished his study of it he decided that it would work better in the foundry than anywhere else. He said that under scientific management his company had increased production, improved the quality of castings and cut the cost. A great deal, he stated, depends on getting proper men to install the system.

DISCUSSION.

President Olson opened the discussion by stating that the subject sounded technical, but at the bottom scientific management was the application of principles that all foundrymen know and understand. The thing to do is to watch critically the movements of several men and compare one man's movements with another's. Unnecessary movements must be eliminated and the process must be standardized whether working with a tub or molding machine. Scientific management is not speeding up, but making work easier by eliminating movements. He thought a foundry could save money by adopting methods for reducing movements rather than by the installation of up-to-date equipment that is improperly handled.

Mr. Gillett saw great possibility in scientific management in the foundry. He said that the industry was in the first stage of this advancement and that very few foundries were running under full scientific management. He believed there were greater possibilities in time saving than in all other savings put together. He referred to the fact that at the plant in Detroit with which he was formerly associated it was impossible to get the men to make more than 100 molds a day before scientific methods went into effect. However, since that time the production per man has been increased by 50 to 60 molds because the men realize that their wages would not be cut with the increased production. Mr. Corse said that in his shop the foremen as well as the molders are paid a bonus. The foreman gets a bonus increasing geometrically for keeping defective below 15 per cent., and also a bonus for high production. F. H. Schutz, of the H. Mueller Mfg. Company, Decatur, Ill., said that he paid a bonus every three months. He believed that plan was better than paying a weekly bonus, as a man for some reason might fall behind one week and would make it up the next. His molders are given their full pay if their work falls below the regular amount, but if that condition exists for nine months the man is let out.

Robert Wallace, foreman of the brass foundry of the National Cash Register Company, believed that if men are not in sympathy with their employers, scientific management would not amount to much. His company encouraged men to cut out motions and get the maximum production by guaranteeing the price. After the piece work price is set it is guaranteed for a year. If found too low it may be increased, but it is never decreased.

Mr. Karr believed that the whole question was one of the mental attitude of the molder. To get him in sympathy with scientific management he thought that a summary of the papers of the discussion that was coming out ought to be prepared and sent to the men themselves. Later the institute adopted Mr. Karr's suggestion by authorizing the publication of a summary of the discussion and papers for distribution.

Mr. Gillett declared that a point of vital importance was inspection along the whole line. Under scientific management every operation should be inspected so that if there was an error it would not creep the second piece. Phillip Mueller stated that his company was working out plans, which would be adopted shortly, to give prizes to its men for devising improvements in tools and operation. In reply to a question Mr. Gillett said that in the matter of scientific management the small shops had an advantage in that a foundryman with only a few molders knows his men and can put scientific management into effect almost immediately and secure quick results. In large shops it takes a long time to work out a system.

BUREAU OF STANDARDS WORK.

Secretary Corse and C. P. Karr made a report of the work done by the Bureau of Standards in conjunction with a committee from the Institute of Metals. This work is in reference to the preparation of alloys to be used in standardizing the form and dimension of standard list bars. Mr. Karr, associate physicist of the Bureau, was assigned to prepare the alloys and has the work well under way. What has been done was incorporated in the report, which will be published at a later date. Other papers read at this meeting were Core Room Economics, by O. F. Flumerfelt, and Boiling of Metals, by J. W. Richards.

The last meeting of the Institute was held Friday morning, October 17th, and was prolific of discussion. The papers read were Producer Gas for Brass Melting, by E. F. Bulmahn; Commerical Operation of the Hering Furnace, by G. H. Clamer; Silver Plating and Spotting-Out, by C. F. Burgess; Fluxes for Soft Solders, by W. Arthur; Aluminum Solders, by W. Arthur; Approximate Melting Points of Some Commercial Alloys, by A. B. Norton and H. W. Gillett. The paper on Silver Plating was very interesting and is significant of the close relation between the aims of the American Institute of Metals and the American Electro-platers Society. The paper is published in this issue of THE METAL INDUSTRY.

ELECTION OF OFFICERS FOR 1914.

The report of the nominating committee, of which E. A. Barnes was chairman, was then read and the following officers were elected for 1914:

President, G. H. Clamer, Ajax Metal Company, Philadelphia.

Secretary-Treasurer, W. M. Corse, Lumen Bearing Metal Company, Buffalo, N. Y.

Vice-Presidents: For rolling mills—W. H. Bassett, American Brass Company, Waterbury, Conn.; for Michigan and Ohio, F. O. Clements, National Cash Register Company, Dayton, Ohio; for Ontario and Western Canada, C. H. Ivey, Empire Mfg. Company, London, Ont.; for Quebec, Robert Job, Milton Hersey & Co., Montreal, Que.; for Pennsylvania, Jesse L. Jones, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.; for New England, Dr. E. Weintraub, General Electric Company, West Lynn, Mass.; for Chicago and Wisconsin, Fred Moerl, Pullman Company, Chicago; for Illinois, exclusive of Chicago, Phillip Mueller, Decatur, Ill.; for New York and New Jersey, C. A. Finnegan, Empire Smelting Company, Depew, N. Y.; for Virginia and South, E. S. Fretz, Light Foundry & Mfg. Company, Pottstown, Pa. H. W. Gillett was appointed chairman of the Programme Committee.

After the election of officers the 1913 convention was adjourned.

NEXT YEAR'S MEETING.

The officers of the American Foundrymen's Association and of the American Institute of Metals held a meeting and decided that future conventions shall be held in the Spring instead of the Fall. That of next year may be held in the South and that of the following year in New York or some other Eastern city. The Foundry & Machine Exhibition Company has not yet decided whether it will have its exhibition in the Fall next year, or whether it will follow the practice that has been unbroken thus far, of having it at the same time and place as the foundrymen's association conventions.

THE ENTERTAINMENTS.

The entertainment programme arranged for by the entertainment committee, of which Charles B. Carter was chairman, was carried out exactly as planned. More than 200 ladies were guests at the luncheon and theater parties arranged, and the luncheon provided for the men on Wednesday proved a welcome convenience. The banquet, a picture of which we show, on Thursday evening was a pronounced success, approximately 325 men attending, many attracted, perhaps, by the announcement that the programme admitted of no speechmaking. During the informal dinner, orchestra, quartette and cabaret alternated with musical and other sounds that early created an enjoyable atmosphere. Following the banquet, a vaudeville performance of several numbers was staged. In appointments, programme and general "get together" spirit the occasion fittingly closed a very successful convention.

NEW OFFICERS OF THE ALLIED ASSOCIATIONS.

The officers of the American Foundrymen's Association elected for the ensuing year were as follows:

President, Alfred E. Howell, Phillips & Buttorff Mfg. Company, Nashville, Tenn.

Vice-Presidents: R. A. Bull, Commonwealth Steel Company, Granite City, Ill.; H. A. Carpenter, General Fire Extinguisher Company, Providence, R. I.; S. B. Chadsey, Massey-Harris Company, Ltd., Toronto, Ont.; G. R. Lombard, Lombard Iron Works & Supply Company, Augusta, Ga.; T. L. Richmond, Buffalo Scale Company, Buffalo, N. Y.; T. W. Sheriff, Sheriffs Mfg. Company, Milwaukee, Wis.; J. J. Wilson, Cadillac Motor Company, Detroit, Mich.; Walter Wood, R. D. Wood & Co., Philadelphia.

Secretary-Treasurer, Dr. Richard Moldenke, Watchung, N. J.

The meeting of the Associated Foundry Foremen developed into one of unusual interest through a discussion of foundry problems with the aid of blackboard sketches. The officers elected were: President, S. V. Blair, Kalamazoo Stove Company, Kalamazoo, Mich.; vice-president, H. M. Martin, Davis Foundry Company, Hornell, N. Y.; secretary-treasurer, Robert B. Thompson, Buffalo Pitts Company, Buffalo, N. Y.

THE EXHIBITORS, WHAT THEY EXHIBITED AND THEIR OPINIONS REGARDING THE CHICAGO EXHIBITION

Following its custom, THE METAL INDUSTRY formulated several questions, which, if answered fairly, would throw the most light upon what seemed to be the current problem, i. e., the situation regarding next year's convention and exhibition. These questions were sent to all exhibitors, for it was realized that in taking verbal interviews the danger of misinterpretation was present. The questions were as follows:

1. Do you favor a permanent exhibition site in one city?
2. If so, which city?
3. Would you prefer that the Exhibition Company should hold their exhibit in a different city each year?
4. Do you prefer a joint convention of the Allied Foundrymen's Association and the Exhibition Company or of the Exhibition Company holding its exhibit independently of any association?
5. Have you any other remarks to make about the Chicago convention?

The officials of the various associations and exhibition company were also approached on the question, but with one exception these gentlemen stated that they thought it best not to express any opinion until after the meetings of the executive committee, at which time it was expected the situation would be cleared up.

We publish herewith the opinion of Dr. Richard Moldenke, secretary of the American Foundrymen's Association:

"As per resolution of the several executive boards of the Allied Foundrymen's Associations, the annual conventions will again be held in Spring. They had been allowed to run into the late Fall merely to accommodate the Exposition, and as this has now become so unwieldy that the moving spirits of that purely commercial organization find it difficult to get suited in any but a few of the very large cities, they will either have to cut out a lot of extraneous exhibits or else pick out a few definite locations for alternate exhibit purposes.

"While I would very much regret the cutting out of the exhibit feature from the conventions—for their educational value only, however—it is essential to our members that our conventions move about from place to place, in order that we may note advances in foundry practice by visiting plants and exchange information. Should the Exhibit Company for financial reasons decide to pick upon one or two cities for their exhibits, irrespective of where the foundrymen go, they will have our good wishes, and we will go it alone.

"As I have stated above, the educational feature of the exhibits is the only redeeming one of the joint meeting arrangement, as in other respects the exhibitions have become a perfect nuisance so far as holding sessions and preparation of the programme are concerned, the sale of miscellaneous machinery at a fair, and the study of foundry practice at the same time not being conducive to satisfaction at either end.

"As to the next meeting place, this is hard to speak of at the present moment. Every indication points to New York City for 1915, in view of the very probable international character the conventions will have. For 1914 we have invitations from a dozen cities, and Boston, St. Louis and Milwaukee have been specifically mentioned. The general feeling of those foundrymen with whom I have spoken is that the exhibitions come entirely too often, and that this feature could be profitably cut out next year—very little that was really new being shown in Chicago. In that event a selection would be comparatively easy. If, however, an exhibit together with the conventions is decided upon for next Spring, a definite policy will have to be decided upon, as the question of big exhibits and small cities will have to be met right along."

List of Exhibitors.

ACME MACHINE TOOL COMPANY, CINCINNATI, OHIO.

Acme Geared Head Combination Flat Turret Lathe with complete Bar and Chucking equipment. Driven by 5 H. P. Constant Speed Motor. Cincinnati Acme 18 in. Geared Head Universal Turret Lathe.

Represented by Robert Endebrock, Sales Engineer.

THE AJAX METAL COMPANY, PHILADELPHIA, PENNSYLVANIA—BIRMINGHAM, ALABAMA.

Ingot and Babbitt Metals.

Represented by G. H. Clamer, Second Vice-President and Secretary; W. J. Coane, Third Vice-President and Sales Manager; C. F. Hopkins, General Superintendent, and H. L. Carpenter, Manager, Pittsburgh District.

ALBANY SAND AND SUPPLY COMPANY, ALBANY, NEW YORK.

High-class range cast in Albany Molding Sand. Belt Dressing.

Represented by Lawrence Murray, Chas. H. Bird and S. Marshall.

AMERICAN SPECIALTY COMPANY, CHICAGO, ILLINOIS.

Represented by H. L. Mills and J. H. Gurdes.

AMERICAN STEAM PUMP COMPANY, BATTLE CREEK, MICHIGAN.

American Improved Crand and Flywheel Air Compressor, American Outside Center Packed Plunger Boiler Feed Pump, American Bronze-Fitted General-Service Pump, Marsh Bronze-Fitted Vacuum Pump, Marsh Deep-Well Pumping Engines, Marsh Long-Yoke Bronze-Fitted Boiler Feed Pump, American All-Bronze Well Cylinder, Erb Double-Acting Well Cylinder, Sectional Marsh Pump.

Represented by J. M. Stannard, Chicago Manager, G. W. Clucas, H. A. Baker, and J. J. Hayes, Sales Department, and S. C. Byce, Eastern Traveling Engineer.

1. No. 2-3. Yes, with the exception of next year. 4. Joint convention. 5. We would like to see the convention in Chicago next year, and if not there then in Cleveland, Ohio.

THE AMERICAN TOOL WORKS COMPANY, CINCINNATI, OHIO.

"American" High-Duty Lathe, with eight speed patented geared head for motor drive, with miscellaneous tools, bars of material, etc., for testing purposes. "American" Triple-Geared Plain Radial Drill, "American" Bank-Geared Plain Radial Drill, and "American" Single-Geared Crank Shaper.

Represented by the E. L. Essley Machinery Company.

ARCADE MANUFACTURING COMPANY, FREEPORT, ILLINOIS.

Norcross Jarring Machines, Modern Molding Machines, Arcade Squeezers, Arcade Combination Jolt and Squeezers, Sand Sifters, and Plate Making.

Represented by E. H. Morgan, President, Chas. Morgan, Vice-President, L. L. Munn, Jr., Secretary, F. N. Perkins, W. C. Norcross, R. E. Turnbull, August Christen, G. D. Wolfley, G. W. Skinner, Sales Department, Reeve Burton, Advertising Department, B. C. Trueblood, Purchasing Department, H. Tscherning, and F. E. Boedecker, Mechanical Department.

1. Yes. 2. Chicago. 3. No. 4. Jointly. 5. Best ever held.

E. C. ATKINS & COMPANY, INC., INDIANAPOLIS, INDIANA.

Saws for all purposes; Metal Cutting Saws, Circular Metal Saws, Metal Band Saws, Hack Saw Blades, Hack Saw Frames, Machine Knives, Band Saws, Circular Saws, Saw Fitting Tools, Power Hack Saw Machines.

Represented by N. A. Gladding, Sales Manager, S. M. Perrigo, Manager, Chicago Branch, C. R. Hewitt, Metal Saw Specialist, Lewis L. Okey, Wm. deR. Knight, and C. H. Rowlson, Salesmen.

THE AUTOMATIC TRANSPORTATION COMPANY, BUFFALO, NEW YORK.

Electric trucks built and used exclusively for interior trucking. Electric trucks equipped with lifting platform, intended for machine shop work; able to raise its load from four to five feet, converting the truck into a tiering machine.

Represented by L. J. Goodsell, T. F. Donahue, F. W. Bradley, and W. C. Carr.

AYER & LORD TIE COMPANY, CHICAGO, ILLINOIS.

Creosoted Wood Block for Factory Flooring Purposes.

Represented by A. H. Noyes, Assistant Treasurer, Frank A. Weaver, Cleveland, and B. S. McConnell, Representatives.

1. Yes. 2. Chicago. 3. No. 4. Jointly. 5. Great success.

BAIRD & WEST, DETROIT, MICHIGAN.

Solvay Foundry Coke. Joint exhibit with Pickands, Brown & Co.

Represented by Chas. W. Baird, Edwin R. Stoughton, and Gerald Nash.

BAIRD EQUIPMENT COMPANY, CHICAGO, ILLINOIS.

Time Stamps and Electric Clocks.

Represented by Edward P. Baird and R. L. Hight.

THE BERKSHIRE MANUFACTURING COMPANY, CLEVELAND, OHIO.

Power Squeezer Molding Machines, Air Compressors, Core Machines, Vibrators, Flasks, etc.

Represented by R. H. York, President, W. A. Price, Treasurer, and W. D. Fraser, General Manager. Representatives: F. Hulec, F. G. Stewart, F. C. Francesco, George Allen, E. W. Sample, and G. L. Cannon.

W. D. Fraser, General Manager: 3. Yes. 4. Jointly. 5. Good.

CHARLES H. BESLY & COMPANY, CHICAGO, ILLINOIS.

Besly Horizontal Disc Grinders, Besly Disc Grinders, Direct Connected Pattern Maker's Disc Grinder, Helmet Spiral Circles, Boxite Circles, Helmet Oil, Helmet Temper Taps.

Represented by Edw. P. Welles, President, Chas. A. Knill, Manager R. R. Department, Wm. H. Allen, Traveling Representative, Chas. Munson, Advertising Manager, John Miller, Jr., General Superintendent, Robert Miller, Foreman, Frank G. Lane, Head Draftsman. Leo Jacobs, Jas. S. Dodd, Murdock Campbell, O. C. Hansen, Garfield Black, Salesmen, and George Klemp, Demonstrator.

S. BIRKENSTEIN & SONS, CHICAGO, ILLINOIS.

Metal and Supplies for the Brass and Aluminum Foundry.

Represented by H. Birkenstein, L. Kahn, and H. Brown.

BLYSTONE MACHINERY COMPANY, CAMBRIDGE SPRINGS, PENNSYLVANIA.

Core Sand Mixer.

Represented by W. E. Wright, Manager, Luther G. Conroe, and W. J. Pees, Salesmen.

BROWN SPECIALTY MACHINERY COMPANY, CHICAGO, ILLINOIS.

Hammer Core Machines, complete with dies, Core Tapering and Cutting-off Machines, Core Tapering Machines.

Represented by Elmer A. Rich, Jr., President, Herbert T. Rich, Secretary, John Laycock, Superintendent, and Robert Laycock, Foreman.

1. No. 3. No, every two years. 4. Jointly.

A. BUCH'S SONS COMPANY, ELIZABETHTOWN, PENNSYLVANIA.

Jar, Squeeze and Roll-Over Molding Machines, Tapered Aluminum Snap Flasks, Aluminum Cope Squeeze Plates, C. I. Bottom Plates, Pattern Plates, Pattern Frames, Casings, and Floor Flasks, Treated Wood Pattern Boards, Adjustable Steel Slip Bars, Wood Bottom Boards, and Pattern Mounts. Sample castings made on Buch Machines.

Represented by R. S. Buch, President and Treasurer, W. W. Birnstock, Manager and Engineer, H. J. Felsburg, J. L. Nute, and J. E. Buch, Representatives, D. C. Coble, Testing Engineer, and Amos Ream, Demonstrator.

R. S. Buch, President. "I would be opposed to anything of the nature of making a permanent city for the exhibition in one city. Further than that I have nothing to say."

THE BUCKEYE PRODUCTS COMPANY, CINCINNATI, OHIO.

Compressed Air Vibrators, Patent Flask Guides, Parting and Core Compounds, Metal Fluxes, etc.

Represented by Charles J. Goehringer, President and Manager, Dwight S. Marfield, Secretary, Robert B. Ferguson, Charles S. Weigert, J. B. Carpenter, and E. Stamm, Representatives.

1. No. 3. Yes. 4. Joint. 5. A wonderful success and showed Chicago to be a live spot.

THE BULLARD MACHINE TOOL COMPANY, BRIDGEPORT, CONNECTICUT.

Bullard Vertical Turret Lathe, New Era Type, complete with Cutting Lubricant System, Motor Drive, etc., in operation on various classes of work.

Represented by S. H. Bullard, Vice-President, J. W. Bray, and F. B. Smith, Representatives.

BAKER BROTHERS, TOLEDO, OHIO.

High-Speed, High-Power Drilling Machine with compound table, motor driven. Gear Box showing arrangement of gears and method of shifting for High-Speed, High-Power Drill, motor driven, and Keyseater for internal keyseating, motor driven.

Represented by George E. Hallenbeck, Arthur E. Baker, Wallace Elliott, and Michael Smith.

1. No. 3. Yes. 4. Jointly.

BARNES DRILL COMPANY, ROCKFORD, ILLINOIS.

All-Geared Drill, complete with Motor Drive, Sliding Head All-Geared Drill and Tapper, with Motor Drive, and Self-Oiled, All-Steel Geared Manufacturing Drill with Motor Drive.

Represented by B. F. Barnes, President, J. E. Andress, Secretary, and A. M. Johnson, Superintendent.

1. Yes. 2. Chicago. 3. No. 4. Immaterial. 5. Great.

JONATHAN BARTLEY CRUCIBLE COMPANY, TRENTON, NEW JERSEY.

Crucibles, Retorts, etc.

Represented by Samuel H. Dougherty, Western Representative, Herbert D. Cole, Eastern Representative, Lee T. Ward, Pennsylvania Representative, and Lewis H. Lawton, Secretary.

1. No. 3. Yes. 4. Does not make any difference. 5. Best ever, but did not draw enough Eastern trade.

H. E. BARTON TOOL & SUPPLY COMPANY, CHICAGO, ILLINOIS.

Representing the Pittsburgh Pneumatic Company and Stow Manufacturing Company.

Electric Drills, Grinders and Buffers, Stow Flexible Shafts, Pneumatic Chippers, Heavy-Duty Chippers and Riveters.

Represented by W. B. Smith, H. E. Barton, and Mr. Tucker.

1. Yes. 2. Chicago. 4. Jointly. 5. Chicago ideal location, if local concerns were interested.

BATTLE CREEK SAND SIFTER COMPANY, BATTLE CREEK, MICHIGAN.

Sand Sifters.

Represented by R. R. Wilder.

BENJAMIN ELECTRIC MANUFACTURING COMPANY, CHICAGO, ILLINOIS.

Benjamin Safety Devices for Punch Presses, installed on press which will be in standard operation, Reflector Sockets for lighting factories, Dustproof Lighting Fixtures, Vaporproof Portable Hand Lamps, Screw-drivers, Wire Guards for lighting fixtures, Sockets, Clusters, and other electric lighting specialties.

Represented by H. E. Watson, Sales Manager, Wm. Cottrell, Engineer, Safety Device Department, G. B. Weber and A. E. Lubeck, Salesmen.

1. Yes. 2. Chicago. 3. No. 4. Jointly.

BENNETT-O'CONNELL COMPANY, CHICAGO, ILLINOIS.

Plating Dynamo, Motor Generator Set, Mechnical Plating Barrel, Polishing Lathes, Polishing Wheels, Plating Supplies and Chemicals.

Represented by M. J. O'Connell, President, C. D. Bennett, General Manager, S. E. Huenerfauth, General Superintendent, Louis Schulte, Expert Chemist Plater, and Fred C. Ohlmacher, Salesman.

M. J. O'Connell, President: 1. Yes. 2. Chicago. 4. Jointly. 5. Great success because of location.

CALUMET FOUNDRY EQUIPMENT COMPANY, HARVEY, ILLINOIS.

Foundry Equipment.

Represented by R. A. Dugan, C. A. Dugan, and J. T. Krieger.

THE CARBORUNDUM COMPANY, NIAGARA FALLS, NEW YORK.

Carborundum and Aloxite Products, Carborundum Wheels, Carborundum Rubbing Bricks, Carborundum Discs, Carborundum Grains, Aloxite Wheels, Aloxite Cloth, and Carborundum Fire Sand.

Represented by George R. Rayner, General Sales Manager, O. C. Dobson, J. H. Jackson, H. E. Kerwin, R. C. Bradbury, and L. J. Pfohl, Salesmen.

THE CHICAGO EXHIBITION. VIEW OF FOUNDRY EQUIPMENT IN THE MAIN PART OF THE AMPHITHEATER.

CARTER METALS CLEANING COMPANY, PHILADELPHIA, PENNSYLVANIA.

Evans High-Pressure Sand Blast Machine.

Represented by George W. Garman, Salesman.

CATARACT REFINING & MANUFACTURING COMPANY, BUFFALO, NEW YORK.

Samples of Core Oils and Cutting Compounds. Sample Cores.

Represented by R. J. Collins, Sales Manager, F. E. Hill, Eastern Sales Manager, E. P. Hughes, Central Sales Manager, and D. L. Baldwin, Western Sales Manager.

1. No. 3. Yes. 4. Jointly. 5. No. Would recommend Boston for next convention.

CELFOR TOOL COMPANY, BUCHANAN, MICHIGAN.

Represented by Walter Nochumson.

CHICAGO PNEUMATIC TOOL COMPANY, CHICAGO, ILLINOIS.

Valve Sand Sifter, Drills, Grinders, Air Compressors, Keller Rammers, Riveting and Calking Hammers, and Chicago Hose Couplings.

Represented by J. G. Osgood, General District Manager, E. Aplin, C. H. Schumacher, A. E. Conrow, A. C. Andresen, G. W. Parker, Chicago Representatives, W. C. Walker, Manager, Cincinnati, and C. Humphrey, Pittsburgh.

CHICAGO PULLEY & SHAFTING COMPANY, CHICAGO, ILLINOIS.
Testing Apparatus, Oiling Babbitted Bearings, Roller Bearings, and New Departure Self-Aligning Ball Bearings for Shaft Hangers. Oneida Steel Split Pulley, mounted on ball bearings and driven with silk thread.
Represented by S. A. Ellicson, Treasurer, O. Stangland, Secretary, W. F. Doggett, F. A. Mills, and R. W. Gantzer, Salesmen.

THE CINCINNATI BICKFORD TOOL COMPANY, CINCINNATI, OHIO.
Cincinnati 24 in. High-speed, Shaft-driven Upright Drill with patent geared tapping attachment, gear box and motor drive. Cincinnati Bickford 4 ft. Regular Plain Radial Drill, variable speed motor drive. Wizard chucks and collets.
Represented by A. H. Tuechter, President, S. C. Schauer, Vice-President, G. P. Gradolf, Secretary, H. M. Norris, M. E. Lee Schauer, John Kerking, and C. W. Sutton, Demonstrators.

THE CINCINNATI MILLING MACHINE COMPANY, OAKLEY, CINCINNATI, OHIO.
Vertical High-Power, Motor-Driven Miller in operation, Universal High-Power Miller, and Universal Cutter Grinder in operation.
Represented by John G. Klaiber.
1. Yes. 2. Chicago. 3. No. 4. Jointly.

THE CINCINNATI PLANER COMPANY, OAKLEY, CINCINNATI, OHIO.
Thirty-six inch x 36 in. x 8 ft. Heavy Pattern Cincinnati Planer, with four heads, equipped with Triumph-Monitor Reversible Motor Drive.
Represented by B. B. Quillen, Secretary, and Charles Meiers, Sales Engineer.
1. Two cities. 2. Chicago and Pittsburgh. 3. No. 4. Jointly.

THE CINCINNATI PULLEY MACHINERY COMPANY, CINCINNATI, OHIO.
Represented by L. B. Patterson, President, and J. G. Hey, Vice-President.

CHARLES J. CLARK, CHICAGO, ILLINOIS.
The Clark Blast Meter.
Represented by Charles J. Clark.

THE CLEVELAND PNEUMATIC TOOL COMPANY, CLEVELAND, OHIO.
Chipping, Calking and Beading Hammers, Sand Hammers, Riveting Hammers, Core Breakers, Floor Rammers, Bench Rammers, Core Rammers, Portable Emery Grinders. Air Drills, Plain-geared and Compound-geared. Corner Drills, Rotary Drills, Breast Drills, etc., Valve Grinders in different sizes. Bowes Air Hose Couplings in 45 styles and sizes. Never Slip Hose Clamps in different sizes, Pneumatic Hose.
Represented by H. S. Covey, Secretary, Arthur Scott, Superintendent, C. J. Albert, Manager Chicago office, J. T. Graves, Salesman, Chicago.

THE CLEVELAND WIRE SPRING COMPANY, CLEVELAND, OHIO.
Steel Boxes and Barrels, Barrel Trucks, Steel Shelving, Core Racks, and Springs of all kinds.
Represented by J. W. Campbell, Manager Sheet Metal Department, Cleveland, J. B. Marshall, Western Manager, and A. S. Chave, Salesman, Chicago.

CLIPPER BELT LACER COMPANY, GRAND RAPIDS, MICHIGAN.
Clipper Belt Lacer, Baby Lacer, Clipper Belt Hooks.
Represented by Charles P. Foote, President, James K. Diamond, Superintendent, W. K. Lee, Salesman, John Lipp, and A. C. Hewson, Representatives.
1. No. 3. Yes. 4. We are not particular. 5. Quite satisfactory from our standpoint.

THOMAS E. COALE LUMBER COMPANY, PHILADELPHIA, PENNSYLVANIA.
White Pine Pattern Lumber, Spruce Flask Plank, California Redwood, Mahogany Pattern Lumber.

COMMONWEALTH EDISON COMPANY, CHICAGO, ILLINOIS.
Central Station Service and Supplies.
Represented by D. H. Howard, Advertising Manager, C. H. Seaver, Paul Bird, A. D. Haflenger, and E. L. Kramer.

COWAN TRUCK COMPANY, HOLYOKE, MASSACHUSETTS.
Cowan All-Metal Transveyors.
Represented by E. J. Smith, Chicago Representative.
1. No. 3. Yes. 4. Independently. 5. Results most satisfactory.

THE CRAWFORD OIL & CHEMICAL COMPANY, CLEVELAND, OHIO.
Core Oils and Cores, Match Oil, and Matches, Waterproofing Oil, and Paint Oil.
Represented by George A. Burman, Werner G. Smith, and Paul S. Crawford.
1. No. 3. Yes. 4. Jointly.

CURTIS PNEUMATIC MACHINERY COMPANY, ST. LOUIS, MISSOURI.
Foundry Overhead Traveling Cranes, Sand Blasts, Overhead Trolley System, Air Compressor in operation, Air Hoists. ....
Represented by E. J. Clark, Advertising Manager, L. C. Blake, and J. W. Stjernstedt, Sales Engineers.
E. J. Clark, Advertising Manager: 1. Favor Chicago each year. 4. Joint convention.

DAVENPORT MACHINE & FOUNDRY COMPANY, DAVENPORT, IOWA.
Power Squeezers, Combination Jolt Rollover Pattern Draw Machines, Plain Jolter, and Ford Hand Rollover.
Represented by John T. Anderson, Superintendent, A. J. Goss, Sales Manager, and Hugh Gallagher, Salesman.

DAVIS-BOURNONVILLE COMPANY, CHICAGO, ILLINOIS.
Portable and Stationary Oxy-Acetylene Apparatus, Acetylene Generator Oxygraph, Cutting Apparatus and Welding Apparatus.
Represented by W. S. Schoenthaler, Sales Manager, R. O. Mueller, J. A. Turner, and C. F. Williams, Erecting Engineer.
1. Yes. 2. Chicago. 3. No. 4. Joint. 5. A success.

DIAMOND MACHINE COMPANY, PROVIDENCE, RHODE ISLAND.
Disc Grinding Machine, complete with sliding table, ring wheel chuck, steels discs, cementing press and accessories.
Represented by the E. L. Essley Machinery Company.

DINGS ELECTRO-MAGNETIC SEPARATOR COMPANY, MILWAUKEE, WISCONSIN.
Magnetic Separators, Magnetic Pulleys, in operation.
Represented by M. Dings, President, and R. A. Manegold, Secretary.
M. Dings, President: 1. No. 2. Milwaukee for 1914. 3. Yes. 4. Yes.

JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY, NEW JERSEY.
Crucibles and Graphite Products.
Represented by Dudley A. Johnson, Salesman Chicago office, in charge, A. L. Haasis, Boston, John A. Condit, Buffalo, Frank Krug, Philadelhpia, W. B. Allen, F. R. Brandon, and H. C. Sorenson, Salesman.

STANLEY DOGGETT, NEW YORK CITY.
Parting Compounds, Soapstone and Lead Facings, Core Binders and Washers, Iron Cement, Metal Workers' Crayons and Pencils.
Represented by Henry A. Roffmann, Robert Allabach, Frank Schliemann, and Stanley Doggett.
1. No. 3. Yes. 4. Exhibition Company holding exhibition independently. 5. Cost of exhibition space too high.

DUPLEX SHAKER WORKS, CHICAGO, ILLINOIS.
Electric Duplex Sand Riddling Machine, Air Duplex Sand Riddling Machine, Single Sand Riddling Machine.
Represented by I. E. Burtis, Manager, W. E. Duffield, Treasurer, and M. K. Ross.
1. Yes. 2. Chicago. 3. No.

THE E. L. ESSLEY MACHINERY COMPANY, CHICAGO, ILLINOIS.
High-Duty Lathes, Radial Drills, Crank Shapers, Horizontal Boring Machines, Turret Lathes, Plain Miller, Ball-Bearing Drills, and Tool-Room Lathes.
Represented by E. L. Essley, President, J. R. McDonald, Vice-President, H. F. Roberts, Secretary, C. M. Robertson,

C. K. Cairns, J. G. Wonn, and L. A. Dolton.
1. Yes. 2. Chicago. 3. No. 4. Jointly. 5. Highly satisfactory.

FEDERAL FOUNDRY SUPPLY COMPANY, CLEVELAND, OHIO.
Small Bench Core Jarring Machine, Jolt Machines, Jolt Rollover and Direct Draw Machine, Federal Composition for making of Pattern Plates, Match Plates and Matches, Corline Liquid Binder, Federal Adjustable Steel Slip Jackets, Plumbagos, Core Compounds, Core Washes, Core Oils, Parting Compounds.
Represented by W. J. Adams, President, Ralph Ditty, Secretary and Treasurer, John Bayer and Ellsworth Kaye, Representatives.
1. No. 3. Yes. 4. Jointly.

FELT & TARRANT MANUFACTURING COMPANY, CHICAGO, ILLINOIS.
Comptometer Controller-Key Adding and Calculating Machine.
Represented by John C. Nevins, General Sales Manager, R. E. Bell, Chicago Sales Manager, J. M. Furnas, Assistant, C. J. Ellis, and O. L. Volter.
1. No. 3. Yes. 4. Jointly.

FLEXIBLE STEEL LACING COMPANY, CHICAGO, ILLINOIS.
Alligator Steel Belt Lacing and Turtle Belt Fasteners.
Represented by G. E. Purple, President, and P. S. Rinaldo, Secretary.

THE S. FREEMAN & SONS MANUFACTURING COMPANY, RACINE, WISCONSIN.
Strip and Roll-Over Molding Machine, Standard Stripping Plate Machines, and Aluminum Match Plates.
Represented by Chas. Freeman, President, Stephen Freeman, Secretary, James Garvey, Manager Agricultural Sales Department, John Dearsley, Superintendent Molding Machine Department, Edward Freeman, Purchasing Agent, Michael Freeman, General Superintendent.

THE GARDEN CITY SAND COMPANY, CHICAGO, ILLINOIS.
Molding Sand, Fire Brick, Cupola Blocks, Fire Clay, Gannister, Crushed Quartz, Loam Core Sand, Furnace Sand, Silica Sand, Stonekote, Water Proofing, Sand Blast Sand, Fire Sand.
Represented by C. B. Shefler, President, C. S. McNeal, Manager Foundry Department, and William Chambers.

THE GARDNER GOVERNOR COMPANY, QUINCY, ILLINOIS.
Vertical Self-Oiling and Horizontal Self-Oiling Air Compressors.
Represented by Jos. W. Wall, Secretary, Wm. B. Frey, Purchasing Agent, Edward M. Loeffler, Superintendent Foundry, Quincy, Ill., Robt. A. Kiefer, Assistant Superintendent, M. D. Cheesman, Superintendent Foundry, La Grange, Mo., M. W. Maloney, Manager, and Lawrence Bremser, Assistant Manager, Chicago office.

GARDNER MACHINE COMPANY, BELOIT, WISCONSIN.
Disc Grinders, Setting-up Wheel Presses, Roll Sanding Machine, Ball Bearing Polishing Lathes, Ring Wheel Chucks. Complete line of Disc Grinder Supplies.
Represented by Frederick E. Gardner, Vice-President, L. W. Thompson, Secretary, E. B. Gardner, Advertising Manager, Walter B. Leishman, Sales Manager, J. M. Gardner, Special Representative, Wm. Townsend, and Dale Graves, Demonstrators.

GENERAL ELECTRIC COMPANY, SCHENECTADY, NEW YORK.
Induction Motor-Driven and Turbine-Driven Centrifugal Air Compressors.
Represented by Wm. T. Dean, Manager Power and Mining Department, H. L. Blankenburg and E. A. Hults, Sales Agents, P. & M. Department.

GILL CLAY POT COMPANY, MUNCIE, INDIANA.
Brass Furnace Liners, High-Grade Fire Clay Products.

VIEW OF THE EXHIBITION IN THE SOUTH WING OF THE AMPHITHEATER.

Brass Furnace Covers, Base Blocks, Flues, Cupola Blocks.
Represented by Chas. O. Grafton, Secretary, John H. Gill, Assistant Secretary.
1. No. 3. Yes. 5. Very satisfactory.

GISHOLT MACHINE COMPANY, MADISON, WISCONSIN.
Periodograph (Time Registering System).
Represented by H. S. Johnson, Vice-President, W. L. Miller, H. B. McCabe, and J. E. Ruth, Engineers.

THE GLOBE STEEL COMPANY, MANSFIELD, OHIO.
Samples of all sizes of Chilled Shot or Iron Sand, for use in sand blast machines in place of sand. Castings, Pinions and Gears, and other articles cleaned with shot.
Represented by P. G. Myers, Manager Shot Blast Department.
1. No. 3. Yes. 4. Joint convention. 5. Good exhibit.

GOLDSCHMIDT THERMIT COMPANY, NEW YORK CITY.
Samples of metals and iron alloys free from carbon. Thermits from which different metals are products. Samples of roll repairs. Samples of work done, with equipment for doing same. Demonstration showing intense heat produced by the chemical reaction of thermit.
Represented by Henry S. Mann, Chicago Manager, Dr. E. A. Beck, Chief Metallurgist, New York, A. F. Braid, Metallurgist, C. D. Young, and Alfred Beaulieu, Chicago.
1. No. 2. Would favor Chicago frequently. 3. Yes—modified by 2. 4. Jointly. 5. Think exhibition and convention should be held in same building.

THE GOODALE COMPANY, KALAMAZOO, MICHIGAN.
Matchplates—Machine and Floor. Castings made from plates and stoves made from plates. Aluminum Matchplates.
Represented by J. C. Goodale, W. C. Bogenschutz, and H. C. Howard.
1. No. 3. Yes. 4. Joint. 5. Biggest and best yet held.

GOULD & EBERHARDT, NEWARK, NEW JERSEY.
12 in. Invisible Type Shaper with direct-current variable-speed motor drive with Automatic Starter and Dynamic Brake. 12 in. Gear Hobber with direct-current motor drive, with Automatic Starter.
Represented by Frederick L. Eberhardt, President, and Mr. Keller, Demonstrator.
1. No. 2. Chicago and some Eastern city well located for manufacturers to attend. 3. Possibly. 4. Jointly.

GREAT WESTERN MANUFACTURING COMPANY, LEAVENWORTH, KANSAS.
Combs' Gyratory Foundry Riddle, Electrically Driven. Combs' Gyratory Foundry Riddle, Air Driven.
Represented by F. A. Pickett, Secretary, and George W. Combs, Superintendent.
1. Yes. 2. Chicago. 3. No. 4. Jointly. 5. Congratulations!

GREAT WESTERN SMELTING & FEFINING COMPANY, CHICAGO, ILLINOIS.
Ingot Brasses and castings made from the ingots. Babbitts of various descriptions and grades, die-cast bushings and bearings.
Represented by S. Spiro, J. Collin, A. L. Levy, Arthur Lewis, J. B. Neiman, and I. N. Perlstein, Representatives.

GREAVES, KLUSMAN & COMPANY, CINCINNATI, OHIO.
Greaves-Klusman All-Geared Head-Heavy Quick-Change Screw Cutting Engine Lathe, and Heavy Standard Screw Cutting Engine Lathe.
Represented by W. A. Greaves.

HANNIFIN MANUFACTURING COMPANY, CHICAGO, ILLINOIS.
Air-Operated Chucks, Countershafts, Clamping Fixtures, Vises and Mandrels. Air-Operated Fire-Doors, Collapsing Taps.
Represented by M. J. Hannifin, President, H. A. Schultz, Vice-President, A. V. Hannifin, Secretary, J. R. Stone, Detroit Manager, and L. M. White, Cleveland Manager.
1. Yes. 2. Chicago. 4. Jointly. 5. No.

HAWLEY DOWN-DRAFT FURNACE COMPANY, EASTON, PENNSYLVANIA.
The Hawley (Schwartz) Furnace.
Represented by W. J. Daub, President, and J. H. Whittington.
1. No. 3. Yes. 4. Jointly.

THE HAYWARD COMPANY, NEW YORK CITY.
Electric Motor Clam Shell Buckets, Orange Peel Buckets, and Drag Scraper Bucket.
Represented by H. S. Atkinson, Engineer, H. M. Davison, Representative, and C. S. Sargent, Electrical Engineer.

HERMAN PNEUMATIC MACHINE COMPANY, ZELIENOPLE, PENNSYLVANIA.
Herman Jar-Ram, Rollover and Pattern-Drawing Machine, Combination Jar-Ram, Rollover and Stripper, and Plain Jarring Machines.
Represented by A. M. Frauenheim, President, M. L. Heyl, Secretary, A. Rodgers, L. R. Palmer, and Robert M. Porteous, Salesmen, and Robert F. Ringle, Chief Engineer.

HILL-BRUNNER FOUNDRY SUPPLY COMPANY, CINCINNATI, OHIO.
Foundry Supplies.
Represented by John Hill and Merrill Z. Fox.
John Hill, President, says that he believes the exhibit should be held in any city that can handle it once every two years and in connection with the Foundrymen's Association.

THE HILL & GRIFFITH COMPANY, CINCINNATI, OHIO.
Peerless Perforated Chaplets, Haskins Patent Ventilated Chaplets, and other foundry specialties.
Represented by D. T. Richards, President, Wm. Oberhelman, Vice-President, J. M. Glass, Sales Manager, Jas. A. Carey, Resident Manager, Pittsburgh, F. W. Weissmann, Chemist, George H. Kersting, J. H. Lyle, and F. McCarthy, Representatives.
1. No. 2 and 3. Yes. 4. Jointly.

HOEVEL SANDBLAST MACHINE COMPANY, NEW YORK CITY.
Sandblast Machines with Rotary Table. Sandblast Machines with Revolving Barrel. Central Iron Works Dust Arrester, Oeking Triple Combination Punch Shear and Bar Cutter.
Represented by F. H. Scantlebury, Vice-President, Richard B. Franken, Assistant to President, George A. Cooley, Western Representative, Jesse J. Bowen, Eastern Representative, E. Wiese, Superintendent, Geo. J. Ballweber, Foreman, and C. J. Dessez.
1. No. 3. Yes. 4. Jointly.

HOLLAND CORE OIL COMPANY, CHICAGO, ILLINOIS.
Core Oils.
Represented by H. L. Baumgardner.

HOSKINS MANUFACTURING COMPANY, DETROIT, MICHIGAN.
Hoskins Electric Furnaces. Hoskins Thermo-Electric Pyrometers, including Portable, Wall, Illuminated-scale, and Recording Types. Hoskins Electric Hot-Plates for Laboratories. International Electric Meters. Miscellaneous products for the use of chemists and assayers.
The heat treating furnaces and pyrometers will be operated in connection with a demonstration of tool hardening by electricity.
Represented by W. D. Little, Sales Manager, A. B. Tilton, Advertising Manager, C. F. Busse, Chicago Representative, C. R. Holmes, Salesman, and R. B. Lincoln, Service Engineer.
1. Yes. 2. Chicago and Pittsburgh. 3. No. 4. Jointly. 5. No.

HUNTER SAW & MACHINE COMPANY, PITTSBURGH, PENNSYLVANIA.
Inserted Tooth Saw Grinder, Saw Sharpeing and Beveling Machine, Inserted Tooth Saw Blades, Hot Saws, Tube Saws, Vanadium Steel H. S. Friction Saw, Bryant Saw Blades, Higley Lea-Simplex and Lea-Courtnay Saw Blades.
Represented by F. A. Hunter, General Manager, and G. W. Agerter, Office Manager.
1. No. 3. Yes. 4. If consolidation will be the means of reaching a wider field then we favor it. 5. Good.

IDEAL FURNACE COMPANY, CHESTER, PENNSYLVANIA.
Tilting Crucible Furnace for melting Iron, Copper, Brass, Bronze, Aluminum, etc.
Represented by P. J. Sweeney and J. S. Scully.
1. No. 3. Yes. 5. No.

INDEPENDENT PNEUMATIC TOOL COMPANY, CHICAGO, ILLINOIS.
Thor Pneumatic Chipping Hammers, Calking Hammers, Flue Beading Hammers, Riveting Hammers, and Sand Rammers. Thor Piston Air Drills, Reversible Wood Boring Machines, Flue Rolling Machines, Tapping Machines, Pneumatic Grinders and Electric Drills.
Represented by J. D. Hurley, Vice-President, F. W. Buchanan, Secretary, and R. T. Scott, W. R. Gummere, B. A. Durbin, F. J. Passino, and George C. Wilson, Representatives.

INGERSOLL-RAND COMPANY, NEW YORK CITY.
Air Compressors, Single and Two-Stage Electric Driven. Pneumatic Chipping Hammers, Pneumatic Riveting Hammers, Pneumatic Scaling Hammers, Pneumatic Motor Hoists, Stationary Motors, Piston Drills, and Sand Rammers.
Represented by W. H. Armstrong, Manager, P. T. Department, W. A. Armstrong, Manager, Cleveland, J. L. Kelly, Pittsburgh, James Moran, New York, Lloyd J. Davis, James P. Gillies, Grover C. Lucker, and James D. Rathbun, Salesmen, Chicago Office, C. W. Bugbee, St. Louis Office, and D. A. Slattery, Milwaukee, Office.
1. Not unless suitable power facilities are available. 2. Centrally located. 3. Yes, as above. 4. Jointly. 5. No.

INTERNATIONAL MACHINE TOOL COMPANY, INDIANAPOLIS, INDIANA.
"Libby" Heavy-Duty Turret Lathe, with tool equipment for gear blanks.
Represented by L. A. Dolton, Special Representative, and R. H. Bradford, Demonstrator.
1. Yes. 2. Chicago.

INTERNATIONAL MOLDING MACHINE COMPANY, CHICAGO, ILLINOIS.
Power Squeezers, Stripping Plate Machines, Jarring Machines, Hand Turn-Over Draw Machines, Power Turn-Over Draft Machines, and Combination Machines.
Represented by Edward A. Pridmore, President, W. W. Miller, Vice-President, D. C. Snow, Secretary, J. W. Dopp, Sales Manager, and E. H. Schwartz, Salesman.

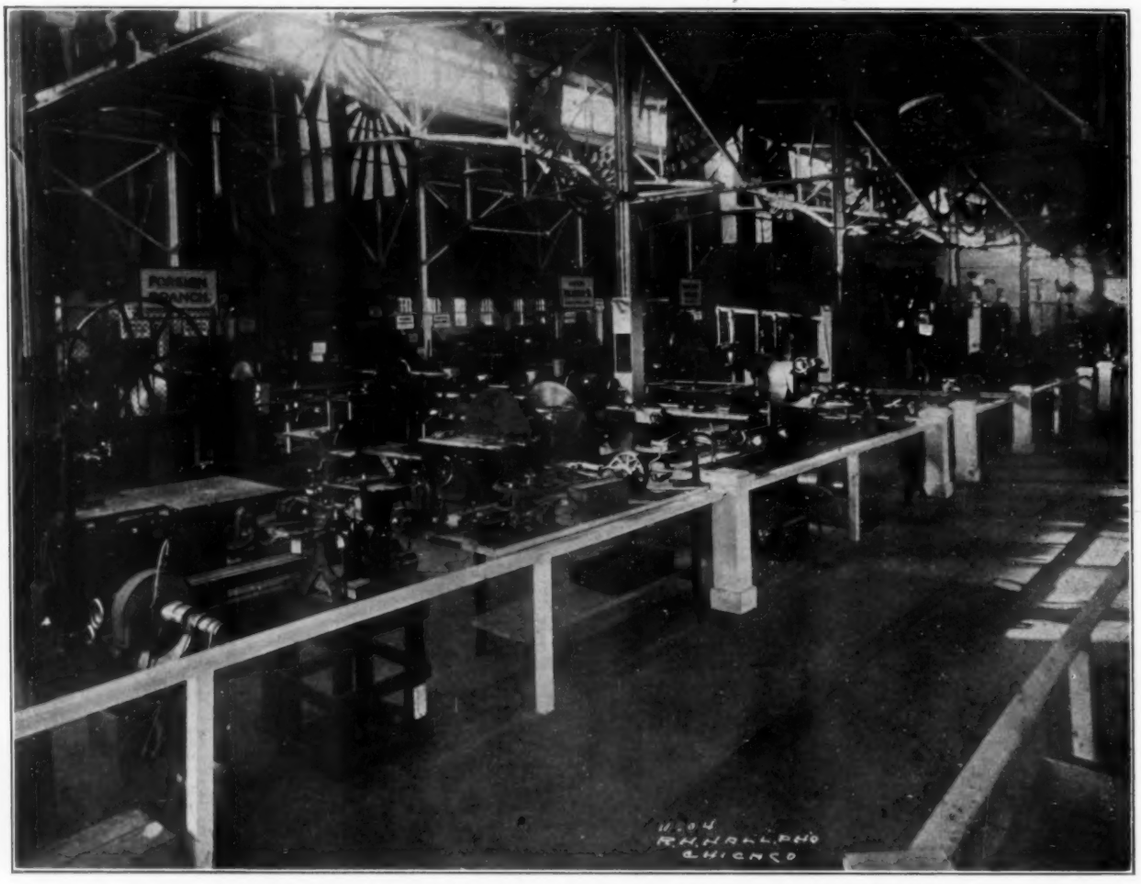
THE INTERSTATE SAND COMPANY, ZANESVILLE, OHIO.
Molding Sand, Silica Sand, Silica Wash, Ground Fire Clay, and Dux Back Parting.
Represented by E. M. Ayers, President, L. K. Brown, Secretary, and F. L. Moore, Representative.

THE JENNISON-WRIGHT COMPANY, TOLEDO, OHIO.
Sections of Kreolite Block Machine Shop Floors. Models of best methods of installing machinery on Kreolite Block Floors. Exhibit showing section of Kreolite Wood Blocks resisting the action of sulphuric acid. Sections of Kreolite Structural Timbers and Kreolite Lug Blocks.
Represented by F. E. Jennison and F. M. Enright, Western Representatives, Frank W. Cherrington, Chief Engineer, W. E. Wright, Manager Industrial Sales, and R. W. Johnson.
1. No. 3. Yes. 4. Joint convention.

CHARLES C. KAWIN COMPANY, CHICAGO, ILLINOIS.
Chemists and Metallurgists.
Represented by Chas. C. Kawin, President, J. F. Nellis, Vice-President, Wm. J. Mulcahy, Secretary, R. J. Courtney, and J. H. Hopp.
C. C. Kawin, President: 1. No. 3. Yes. 4. Immaterial.

T. P. KELLY & COMPANY, INC., NEW YORK CITY.
Foundry Supplies.
Represented by Walter F. Kaine, Jr., Secretary, and Edwin R. Wolverton, Manager Chicago branch.
1. No. 3. Yes. 4. Jointly. 5. No.

KEMPSMITH MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN.
Represented by Frank Wollaeger, Jr., Sales Department, and Chas. Drewes, Demonstrator.
1. Yes. 3. No. 4. Jointly. 5. Good results.



ANOTHER VIEW IN THE MAIN ROOM OF THE CHICAGO FOUNDRY EXHIBITION.

JULIUS KING OPTICAL COMPANY, CHICAGO, ILLINOIS.
"Saniglas" King's Safety Goggles.
Represented by J. T. Brayton, Manager, and J. J. Duffy, Salesman.
1. Yes. 2. Chicago. 5. No.

THE KNICKERBOCKER COMPANY, JACKSON, MICHIGAN.
Morse Rarified Dust Collector.
Represented by W. B. Knickerbocker, President and General Manager, and W. B. Knickerbocker, Jr., Secretary and Treasurer.

LANDIS MACHINE COMPANY, WAYNESBORO, PENNSYLVANIA.
Double-Head Bolt Cutters, Stationary Pipe Die Heads, Automatic Die Heads, and Solid Adjustable Die Heads.
Represented by J. G. Benedict, General Manager, C. F. Meyer, and F. W. Heefner.
1. Yes. 2. Chicago. 3. No. 4. Prefer joint meeting. 5. Satisfactory.

THE H. M. LANE COMPANY, DETROIT, MICHIGAN.
Represented by H. M. Lane, O. F. Flumerfelt, P. L. Keachie, and T. A. Leyshon.

LA SALLE MACHINE & TOOL COMPANY, LA SALLE, ILLINOIS.
La Salle No. 1 Plain and Surface Grinder with Micrometer adjustment.
Represented by F. W. Matthiessen, Jr., General Manager, and S. M. Trenary, Sales Manager.
1. Yes. 2. Chicago. 3. No. 4. Jointly.

THE LEHON COMPANY, CHICAGO, ILLINOIS.
Mule-Hide Roofing, Insulating Paper, Fireproof Cloth, Waterproof Cloth, Coal Bags, Wagon Covers, Horse Covers, and Saturated Burlap.
Represented by Tom Lehon, General Manager, and D. B. Wright, Advertising Manager.

THE LODGE & SHIPLEY MACHINE TOOL COMPANY, CINCINNATI, OHIO.
18 in. x 8 ft. Selective Head Engine Lathe, 16 in. x 6 ft. Universal New Model Tool Room Lathe with Selective head.
Represented by J. Wallace Carrel, Sales Manager, and N. D. Chard, Superintendent.
Considered the exhibition very successful, and if such a good convention could be held every year would be in favor of such an exhibition and would exhibit, if possible, at both Chicago and New York each year.

DAVID LUPTON'S SONS COMPANY, PHILADELPHIA, PENNSYLVANIA.
Lupton Steel Sash and Steel Partitions, Pond Continuous Sash, Pond Operating Device, Pond Truss for Foundry and Forge Shops. Large photographs of illustrations of designs in roof lighting and ventilating.
Represented by Clarke P. Pond, Sales Manager, R. A. Sanborn, Chicago, Manager, and George G. Wagner, M. E., Chicago.

MACLEAN PUBLISHING COMPANY, TORONTO, CANADA.
Trade Publications.
Represented by A. H. Byrne, Western U. S. Representative, Frank T. Young, Ontario Representative, and H. V. Tyrrell, Manager.

MANUFACTURERS' EQUIPMENT COMPANY, CHICAGO, ILLINOIS.
Turret Lathe in operation demonstrating Aero Chuck and Collapsible Tap. Complete line of Aero Chucks and Collapsible Taps.
Represented by Paul J. Grebel, President, and Chas. George, Treasurer.

THE MACLEOD COMPANY, CINCINNATI, OHIO.
Buckeye Sand Blast, Sand Separator, Oil Burners, and Oxy-Acetylene Plant for Welding and Cutting.
Represented by Walter Macleod, J. W. Mooney, and Fred Neumann.

MARSHALL & HUSCHART MACHINERY COMPANY, CHICAGO, ILLINOIS.
Vertical Turret Lathes, Boring Mills, Upright Drill Presses, Radial Drills, Gang Drills, Shapers, Gear Hobbers, Gear Cutters, Lathes, Turret Lathes, Screw Machines, Planers, reversible motor drive, Bolt Cutters, Grinders, Milling Machines and Cutter Grinders.
Represented by H. C. Elliott, Vice-President, H. W. Jones, J. R. Porter, and C. Odegaard, Representatives.

J. S. MCCORMICK COMPANY, PITTSBURGH, PENNSYLVANIA.
Sand Mixer, Murphy Pistol Sprayer, Hauck Cupola Lighter, General Supplies and Facings.
Represented by J. S. McCormick, President, T. E. Malone, Secretary and Treasurer, and S. R. Costley, Salesman.

MCLAIN'S SYSTEM, MILWAUKEE, WISCONSIN.
Semi-Steel Castings.
Represented by David McLain, President and Manager, and I. V. Scanlan, Secretary-Treasurer.

MERCURY TRUCK COMPANY, CHICAGO, ILLINOIS.
Automobile Trucks.

THE METAL INDUSTRY, NEW YORK CITY.
THE METAL INDUSTRY, and the latest and most up-to-date books on the Founding, Plating and Finishing of Metals.
Represented by T. A. Trumbour, Circulation Manager, L. J. Krom, Managing Editor, Geo. W. Cooper, Advertising Manager, and Edw. B. Fritz, Western Agent.

MIDLAND MACHINE COMPANY, DETROIT, MICHIGAN.
Jar Rammed Grimes Roll-over Machine with power clamp and power pattern draw, Hand-Rammed Grimes Roll-over Molding Machine with cheap composition patterns, and Hand-Rammed Power Roll-over Grimes Machine.
Represented by George L. Grimes, President and Manager, Charles Skeffington, and John Kienle, Salesmen.

MODERN MACHINE & TOOL COMPANY, CINCINNATI, OHIO.
Modern Turret Lathes.
Represented by E. L. Essley Machinery Company.

THE MONARCH ENGINEERING & MFG. COMPANY, BALTIMORE, MARYLAND.
Various models of melting and heating Metallurgical Furnaces, Oil Rivet Forge, Blacksmith and Forge Furnaces, Monarch Core Ovens, assorted lead hardening and melting furnaces, etc.
Represented by H. D. Harvey, Treasurer, James J. Allen, General Manager, M. W. Woodburn, Western Representative, and J. H. Fowler, Eastern Representative.
1. No. 3. Yes. 4. Jointly. 5. No.

MOTT SAND BLAST MANUFACTURING CO., CHICAGO, ILLINOIS.
Sand Blast Barrel, Sand Blast Room, Dust Collector and Fan, and Sand Blast Machine, Hose Type.
Represented by David Mayer, President, E. J. Rosenthal, Vice-President and General Manager, George D. Fletcher, Chief Engineer, Paul Schroeder, Assistant, and Chas. Alvord, Demonstrator.

THE NEW HAVEN SAND BLAST COMPANY, NEW HAVEN, CONNECTICUT.
The New Haven Self-Contained Sand Blast Rolling Barrel. The New Haven Automatic Hose Type Sand Blast Machine.
Represented by Charles A. Driesbach, President, Charles S. Johnson and E. H. Mansfield, Salesmen.

THE NORMA COMPANY OF AMERICA, NEW YORK CITY.
Norma Annular Ball, Thrust, Roller, Combination Bearings and Hirth Minimeters.
Represented by W. M. Nones, General Manager, Geo. R. Bott, M. E.

NORTON COMPANY, WORCESTER, MASSACHUSETTS.
Grinding demonstrations on Swing Frame Grinding Machine, on Flexible Shaft Grinding Machine, and on new model 2 in. Norton Floor Stand. Exhibit of Norton Alundum and Crystolon Grinding Wheels.
Represented by E. W. Dodge, Sales Manager, Carl F. Dietz, Assistant Sales Manager, John Horne, Chicago Manager, C. E. Gillette, and R. G. Williams, Research Department.
1. No. 3. Yes. 4. Jointly. 5. Very good.

THE S. OBERMAYER COMPANY, CHICAGO, ILLINOIS.

Todd Rumbler, Core Ovens, Sprue Cutters, Rosin Mill, Sand Sifter, Brass Molders' Trough, Core Makers' Bench, Core Venting Machine, Brass Molders' Drying Stove, Root Blower, Core Wire Straightener and Cutter, Patternmakers' Vises, Hauck Torches, Emery Wheel Grinders, Fire Brick and Cupola Blocks, etc.

Represented by Theodore Kauffmann, President, E. D. Frohman, S. T. Johnston, C. H. Green, J. J. McDevitt, J. E. Evans, O. J. Peterson, C. M. Barker, F. H. Dodge, W. Fitzpatrick, O. C. Olson, A. N. Wallin, and G. P. Peterson.

THE OHIO SAND COMPANY, CONNEAUT, OHIO.

Samples of our different grades of Molding Sand.

Represented by F. E. Gordon, President, and U. E. Kanavel, Secretary.

OLIVER MACHINERY COMPANY, GRAND RAPIDS, MICHIGAN.

Full equipment of Pattern Shop Machinery, including the following: Universal Wood Milling Machine, Saw Bench, Jointer, Band Saw, Sander, Oilstone Grinder, Jointer, Lathes, Comb, Surfacer, Knife Grinder, Band Saw Filer, Band Saw Setter, Circular Saw Sharpener, Vise, Fitting-up Wheels, Brazer, Circular Saw Set, Knife Balance, etc.

Represented by J. W. Oliver, President, F. A. Baldwin, Treasurer, V. M. Tuthill, Secretary, George F. Reinhard, Vice-President and General Sales Manager, M. D. Baldwin, Superintendent, Arthur Blake, Manager, New York Office, A. S. Kurkjian, Manager, St. Louis Office, J. C. Whitney, Chicago Office, and Walter Y. Mentzer, Demonstrator.

THE OSBORN MANUFACTURING COMPANY, CLEVELAND, OHIO.

Drop Plate Machines, Stripping Plate Machines, Plain Jolt Machine, Direct Draw Roll-over Jolt Machines, Rock-over Drop Draft Machines, Roll-over Rock Down Machines, Drop Plate Squeezer Machines, Air Squeezer Machines.

Represented by H. R. Atwater, Vice-President, E. S. Carman, Chief Engineer, J. H. Galloway, E. F. Streich, M. W. Zeman, Engineer, E. T. Doddridge and J. A. Patterson, Salesmen.

H. R. Atwater, Vice-President: "We are not in favor of a permanent exhibition in any one place. We do not see any particular reason why it should alternate in different cities, provided the show was held alternately in the East and West. I do not think the question of holding the exhibition aside from the association convention is open for discussion."

OXWELD ACETYLENE COMPANY, CHICAGO, ILLINOIS.

Oxweld Cutting and Welding Apparatus, Supplies for Oxy-acetylene Welding.

Represented by H. P. Harding, Sales Manager, W. S. Hoyt, Advertising Manager, J. A. Warfel, E. E. Radcliffe, J. H. Meyer, J. H. Williamson, J. Roy Wilson, G. P. Rose, C. H. Dockson, J. V. Upton, W. H. Yetman, and Karl Byington, Salesmen.

W. S. Hoyt, Advertising Manager: 1. Yes. 2. Chicago. 3. No. 4. Joint convention, if possible, to be held in same city.

A VIEW OF THE NORTH WING AT THE CHICAGO EXHIBITION OF FOUNDRY APPLIANCES.

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND.

Hose Type Sand Blast Machines, Sand Blast Barrels, Ventilating and Dust Collecting Equipment, Sand Dryers, Sand Separating Machines, Sand Blast Cars, Air Separators, Sand Blasted Castings and various Accessories and Supplies for Sand Blasting.

Represented by Thos. W. Pangborn, President, John C. Pangborn, Vice-President, Harry D. Gates, Secretary, Foster J. Hull, Engineer, and W. A. Allbright, Mechanician.

1. No. 3. Yes. 4. Jointly.

E. O. PARTRIDGE, CHICAGO, ILLINOIS.

Emery Grinders.

Represented by E. O. Partridge.

PAWLING & HARNISCHFEGER COMPANY, MILWAUKEE, WISCONSIN.

Five-ton Electric Crane, Three-ton Hoist and Single-

Line Grab Bucket in operation. Crane Motors, Controllers, and I-Beam Trolleys.

Represented by A. G. Henricks, Vice-President and Sales Manager, R. A. S. Johnson, Manager, Chicago Office, Arthur Fritsch, Sales Engineer, and Bruno Fritsch, Demonstrator.

1. Yes. 2. Chicago. 3. No. 4. Jointly. 5. No.

J. W. Paxson Company, Philadelphia, Pennsylvania.

Sand Blast Machines, Sand Blast Tilting Tumbling Barrel, Sand Blast Suction Elevator, Sand Blast Sand Separator. Photographs and Blue Prints of Foundry Equipment.

Represented by H. M. Bougher, President, W. Scott Thomas, Eastern Representative, and I. F. Kremer, Engineering Department.

1. No. 3. Yes. 4. Jointly. 5. No.

Peerless Parting Company, Ottawa, Illinois.

Parting Compound, Ground Tripoli, Ground Silica, Banding Sand, Dry Sand and Red Flint.

Represented by Charles A. Hupp, President, and Arthur A. Gerding, Assistant Secretary.

Pennsylvania Steel Company, Philadelphia, Pennsylvania.

Mayari Pig Iron, together with exhibits of the nickel, chromium, titanium and vanadium present in same. Photographs showing the mining operations in Cuba and the blast furnaces at Sparrow's Point, as well as samples of Mayari Ore. Castings made of a Mayari mixture, marine cylinder, piston, engine guide, mill guides, tight balls, piercing points, cambering rolls, etc.

Represented by Robert F. Gross, Sales Agent, Frank P. Bassett, Drew Allen, George K. Reel, and John A. Hennessey, Salesmen.

1. No. 3. Alternate east and west. 4. Immaterial.

Peterson-National Company, Buffalo, New York.

Core Oils, Dry Core Compound and Parting; also exhibit of Cores and Core Oven in operation in which cores are being dried.

Represented by Robert W. Bull, President, J. A. Drake, Vice-President, J. Johansen, Assistant Treasurer, H. S. Peterson, G. W. Doty, and J. Purvis, Representatives.

Pickands, Brown & Company, Chicago, Illinois.

Solvay Coke—The Fuel without a Fault—in foundry and crushed sizes.

Represented by J. A. Galligan, Geo. A. T. Long, B. T. Bacon, C. L. Miner, Frank T. Lovering, Thos. W. Glasscot, E. A. Bateman, R. S. Dutton, and F. L. Schulze.

1. No. 3. Yes. 4. Jointly. 5. Fine show and convention.

The Prest-O-Lite Company, Inc., Indianapolis, Indiana.

A working exhibit of the Prest-O-Welder. Samples of work welded. Prest-O-Lites designed for welding purposes. The Prest-O-Torch, a new and inexpensive method of soldering and brazing.

Represented by George D. Armstrong, General Sales Manager, W. H. Adkinson, Division Sales Manager, E. J. Rork, Assistant Superintendent, and L. L. Sinclair.

Henry E. Pridmore, Inc., Chicago, Illinois.

Stripping Plate, Rock-over Drop, Power Squeezer, Plain Electric-Driven Jarring, Combination Electric Jolt Rock-over Drop, Electric Jolt Stripping Plate, Power Ramming Stripping Plate, and Hand-Squeeze Stripping Plate Molding Machines.

Represented by Mrs. E. M. Pridmore, President and Treasurer, H. A. Pridmore, Vice-President, A. V. Magnuson, Shop Superintendent, T. J. Magnuson, Assistant, D. F. Eagan, and C. H. Ellis, Traveling Salesmen, and Arthur Leidig, British Representative.

Quigley Furnace & Foundry Company, Springfield, Massachusetts.

Core Ovens, Continous Baking.

Represented by W. S. Quigley, Vice-President, Paul Ramp, Works Manager, William Brewster, Western Sales Manager, H. B. Dempsey, Engineer, and A. W. Moyer.

W. E. Quigley: "1. No. 2. If permanent New York City. 3. Yes. 4. Joint conventions by all means. I believe the association should decide the question for themselves."

Quitman Foundry & Machine Company, Quitman, Georgia.

Casting Machines for producing Car Journal Brasses, and articles in Ferrous and Non-ferrous metals. Patented in U. S. A. Patents pending in Mexico, Canada, England, France, and Germany. Chilled and non-chilled samples will be shown.

Represented by W. W. McCarter, Vice-President.

Robeson Process Company, Pennington, New Jersey.

Glutrin.

Represented by D. S. Robeson, W. Ed. Baird, and T. J. Ryan.

The Wm. V. Robinson Company, Owosso, Michigan.

Automatic Plate Polishing Machines, Automatic Pipe Polishing Machines.

Represented by Wm. V. Robinson, President, and George Valentine, Secretary.

Rockford Drilling Machine Company, Rockford, Illinois.

Four-spindle Vertical Chucking Gang, complete with Jigs, and Special Tools for machining Pinions.

Represented by S. H. Reck, Secretary, J. S. Langwill, Superintendent, and Wallace Glassford, Operator.

1. Yes. 2. Chicago. 3. No. 4. Jointly.

Rock Island Manufacturing Company, Rock Island, Illinois.

Vises for Machine Shop and Foundry Use.

Represented by C. E. Shields, President, S. E. Hamilton, Superintendent, O. J. Shields, Special Representative, and E. W. Scott, Chicago Representative.

C. E. Shields, President: "I believe it best to alternate in Chicago and some Eastern city, for instance Atlantic City. This would mean a permanent exhibit as far as two cities were concerned."

The Sand Mixing Machine Company, New York City.

Self-Propelled Sand Cutting Machine, and Crane Suspended Cutting Machine.

Represented by V. E. Minich, Vice-President, Wm. A. Heartt, Hutton H. Haley, and John Bradley, Representatives, and Chas. L. Benham, Demonstrator.

1. No. 3. Yes. 4. Joint convention by all means. 5. Excellent convention, but expensive, better to have semi-annually.

Wm. Sellers & Co., Inc., Philadelphia, Pennsylvania.

Universal Tool Grinding and Shaping Machine, Improved Drill Grinding Machine, Centrifugal Sand Mixing Machine, all Motor-Driven, and Centrifugal Sand Mixing Machine, Belt-Driven.

Represented by Edward L. Holljes.

Shepard Electric Crane & Hoist Company, Montour Falls, New York.

One-Cage-Controlled Monorail Electric Hoist, Pulpit-Controlled Single I-Beam Electric Hoist, Crane Trolleys, and Foundry Controllers.

Represented by F. A. Hatch, General Manager, R. H. McGredy, Assistant Sales Manager, W. B. Briggs, and N. Prakken, Sales Engineers.

Silica Products Company, Chicago, Illinois.

Silica Molding Sand, Silica Wash, Kleen Kast Facing, Kleen Kast Wash, Claronite.

Represented by Ralph E. Hyatt, President, Harry E. Blood, Secretary, H. W. Gooderl, Chemist, and Otto E. Ritzmann.

Skinner Chuck Company, New Britain, Connecticut.

Represented by E. L. Essley Machinery Company.

The W. W. Sly Manufacturing Company, Cleveland, Ohio.

Sand Blast Mill Equipment.

Represented by W. C. Sly, President, George J. Fanner, Vice-President, P. W. Graue, Western Representative, and T. J. Morgan, Eastern Representative.

W. C. Sly, President, does not favor Chicago for a permanent exhibition, as he considers it too far West. He thinks the exhibition should be held in different cities and in connection with

the Foundrymen's Assocation, and stated that if the exhibit was held separately he would not attempt to exhibit.

R. P. SMITH & SONS COMPANY, CHICAGO, ILLINOIS.
Safety Congress Shoes for Molders.
Represented by J. B. Smith, Jr., Vice-President.

THE SNEAD & CO. IRON WORKS, JERSEY CITY, NEW JERSEY.
Macdonald Roller Ramming Machine, Pattern Drawing Machine and Dumping Box. Cast Iron Flasks, Plaster and Bronze Patterns, Accessories, Overhead Track and Hoist.
Represented by H. P. Macdonald, Superintendent, P. W. Jordan, Foundry Foreman, and Ira Snead, Assistant to Superintendent.

H. P. Macdonald, Superintendent: 1. No. 3. Yes. 4. Jointly.

THE SPRINGFIELD MACHINE TOOL COMPANY, SPRINGFIELD, OHIO.
Ideal Engine Lathe, with Friction-Geared Head, Rapid-Change Gear Device, etc. Fox Monitor Turret Lathe with Friction-Geared Head, Chasing Bar and Taper Attachment.
Represented by Edward S. Montanus, Secretary.

STANDARD SAND & MACHINE COMPANY, CLEVELAND, OHIO.
Standard Batch Mixers, Sand Mixers, Standard Mixer with Hopper, Boot, Bucket and Chain Elevator, Standard Core and Facing Sand Mixer, Standard Mixing, Rolling and Bonding Machine, and Standard Centrifugal Pulverizer.
Represented by H. G. Boughton, President, J. A. Boughton, Vice-President, H. E. Boughton, Engineer, J. L. Hopper, R. S. Hoffman, and F. S. Scoville, Salesmen.

THE TABOR MANUFACTURING COMPANY, PHILADELPHIA, PENNSYLVANIA.
Manufacturers of Molding Machines.
Represented by Wilfred Lewis, President, H. K. Hathaway, Vice-President, H. W. Brown, Secretary, John T. Ramsden, M. E., J. H. Coleman, Dudley Willcox, G. B. Hastings, D. J. Martin, and H. W. Impey.

H. K. Hathaway, Vice-President: "We do not favor a permanent exhibition in any city, but think that an exhibition should be held in different cities not oftener than every two years or possibly every three years. We see no excuse for holding the exhibition if it is not held in connection with the Foundrymen's Association."

THE TITANIUM ALLOY MANUFACTURING COMPANY, NIAGARA FALLS, NEW YORK.
Ferro Carbon-Titanium and Titanium Alloys for use in ferrous and non-ferrous metals.
Represented by Harry H. Cook, District Agent, and Charles Vickers, Metallurgist.

A. Thompson, General Manager, states that as a general proposition he favors holding the exhibition in a different city, as he believes a larger number of prospects may be reached in this way.

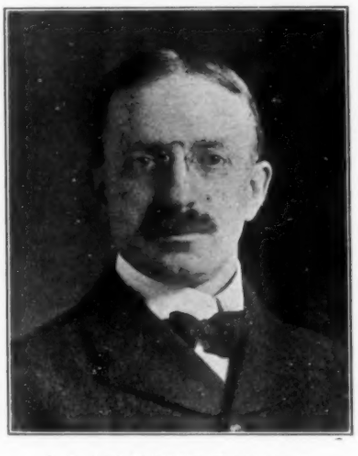
UNION MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT.
Represented by E. L. Essley Machinery Company.

UNITED STATES ELECTRICAL TOOL COMPANY, CINCINNATI, OHIO.
Electric Drills and Grinders.

OFFICERS OF THE FOUNDRY AND MACHINE EXHIBITION COMPANY.

F. N. PERKINS, President.

C. E. HOYT, Secretary.



J. S. McCORMICK, Treasurer.

STERLING WHEELBARROW COMPANY, MILWAUKEE, WISCONSIN.
Rolled Steel Flasks, Snap Flasks, Wheelbarrows, Trucks, Wedges, Skim Gates, Gate Sticks, and Flask Pins.
Represented by I. R. Smith, Secretary and Treasurer, H. H. Baker, Vice-President, J. J. Coyne and J. M. Dickson, Salesmen, Geo. H. Lambkin, New York Manager, E. W. Dowd, New England Representative, and Chas. L. Kirk, Pittsburgh Representative.

1. Not if suitable quarters can be found elsewhere. 2. Chicago. 3. Yes. 4. Jointly.

FREDERIC B. STEVENS, DETROIT, MICHIGAN.
Foundry supplies.
Represented by James F. Hughes.

W. F. STODDER, SYRACUSE, NEW YORK.
Cyclone Sand Blast Nozzle.
Represented by W. F. Stoddard.

SULLIVAN MACHINERY COMPANY, CHICAGO, ILLINOIS.
Belt-Driven Single-Stage Air Compressor, in operation, and Steam-Driven Single-Stage Air Compressor.
Represented by H. M. Boice, Assistant Superintendent, W. P. J. Dinsmoor, District Sales Manager, F. H. Hoge and J. A. Noyes, Sales Engineers.

THE SUPERIOR SAND COMPANY, CLEVELAND, OHIO.
Samples of molding sands for production of aluminum brass, gray iron, and malleable castings.
Represented by Wm. H. Smith, Vice-President, H. C. Koontz, Secretary, and Thomas Moore.
Represented by R. G. Haskins, Chicago District Manager, and G. H. Feltes, Cincinnati Manager.

THE UNITED STATES GRAPHITE COMPANY, SAGINAW, MICHIGAN.
Complete line of graphite products, such as U. S. G. Company's Mexican Plumbago, Boiler Graphite, Paints, Lubricants, etc.
Represented by J. G. Drought, Chicago Sales Manager, W. C. Webb and W. E. Williams, Salesmen.

THE U. S. MOLDING MACHINE COMPANY, CLEVELAND, OHIO.
Plain Air Jar Machines, Combination Jar-Ram Squeeze-Pattern-Drawing Machines, Combination Jar-Ram Squeezing Machines, Plain Air Squeezer Machines, and Combination Jar-Ram, Rollover, Pattern-Drawing Machines.
J. N. Battenfeld, President, and C. F. Battenfeld, Representative.

J. N. Battenfeld, President: 1. No. 3. Yes. 4. Joint convention. 5. Very good results.

VULCAN ENGINEERING SALES COMPANY, CHICAGO, ILLINOIS.
Pneumatic Jolt Rammers with Pattern Drawing Mechanism, Electric Jolt Rammers, Power and Hand Squeezers, Split Pattern Machines and Vibrators, Pneumatic Riveters, Shakers and Electric Riddles and Oscillators, Pneumatic Punches, Mold Dryers, Cold Metal Saws, Shop Saws, Hack Saws, Crane, Pneumatic Hoist, Automatic Saw Grinder and Milwaukee Sprue Cutter.

MUMFORD MOLDING MACHINE COMPANY, NEW YORK.
Represented by E. H. Mumford, Vice-President, James T.

Lee, Sales Manager, T. J. Mumford, Carl Falk, W. H. Huelster, J. T. Georgeson, Salesmen, D. M. Whyte, Expert, and Arthur Hendrickson, Attendant.

E. H. Mumford: 1. Not if housing can be had in different cities. 2. Never saw better facilities than at Chicago, but other cities may have. 3. If can be handled, yes. 4. Joint.

H. S. Vrooman, Chicago, Illinois.

Sand Screening and Separating Machine.

Represented by H. S. Vrooman.

The Wadsworth Core Machine & Equipment Company, Akron, Ohio.

Wadsworth Core Machines, Cutting-Off and Coring Machines, Jar Ramming Machines, Sand Mixing and Compounding Mill, Core Testing Machine, Core Ovens, and Sample Cores.

Represented by G. H. Wadsworth, President, and M. C. Sammons, Secretary.

1. No. 3. Yes. 4. Joint, if possible. 5. Good, but too large. We did not get close enough to our customers. Too much to see in limited time.

Represented by C. A. Hardy, Sales Manager, P. A. Dratz, R. E. Prussing, and R. H. Bourne, Sales Engineers.

The Willard Machine & Tool Company, Cincinnati, Ohio.

Gap Bed Lathe. Tool-Room Lathe, compound geared taper attachment and draw-in collet attachment, Hex. turret on carriage and square turret on carriage.

Represented by G. A. Willard, President, and Perry C. Willard, Secretary.

T. A. Willson & Company, Inc., Reading, Pennsylvania.

Complete line of Eye Protectors for every industrial requirement.

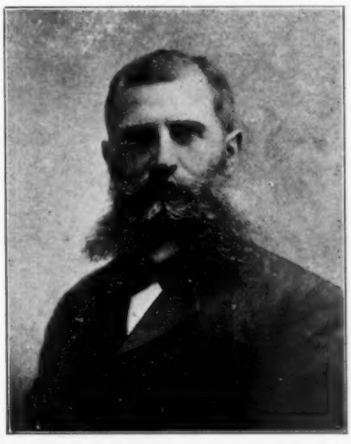
Represented by Frederick Willson, Harold W. Davie, and Benjamin T. Roberts.

1. No. 3. Yes. 4. Jointly.

Wilmarth & Morman Company, Grand Rapids, Michigan.

Wilmarth & Morman Wet Surface Grinder and New Yankee Drill Grinders, Motor-Driven, Combination Cutter, Reamer and Drill Grinder, Motor-Driven, New Yankee Drill Grinders, Belt-Driven, Lathe Center Grinder, Water Tool and Drill Grinder, and Loose Pulley.

OFFICERS OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION.



DR. RICHARD MOLDENKE, Secretary-Treasurer.

The Warner & Swasey Company, Chicago, Cleveland and New York.

Screw Machines and Turret Lathes.

Represented by R. G. Buyer, District Manager, C. E. Neubert, and C. F. Stilwell, Salesmen.

J. F. Webb Manufacturing & Supply Company, Davenport, Iowa.

Pneumatic Power Ramming Molding Machines, Vibrators of varous styles and sizes. The Adams Snap Flask.

Represented by J. F. Webb, President.

J. F. Webb, President: 1. No. 2. ——. 3. Yes. 4. Joint convention.

The West Haven Manufacturing Company, New Haven, Connecticut.

Acme High-Speed Power Hack Saw Machine, Universal Hack Saw Frames and Universal Hack Saw Blades.

Represented by Frank S. Bradley, Secretary and General Manager, and D. Ellis Bell, Chicago Representative.

1. No. Should alternate between three or four of the largest cities. 3. Yes. 4. Jointly. 5. We feel that it was a very successful and instructive exhibition.

Westinghouse Electric & Manufacturing Company, Chicago, Illinois.

Represented by R. H. Moore, A. L. Hampton, and D. A. Moran.

Whiting Foundry Equipment Company, Harvey, Illinois (Chicago Suburb).

Two-ton Converter, 6,000 lb. Teapot Spout Ladle, 10-ton, two-motor Electric Crane Trolley on structural frame, operating 1½ cu. yd. Watters Quick-Detachable Grab Bucket, Tumbler, and Iron Work for one Drawer Type Core Oven.

ALFRED E. HOWELL, President.

Represented by S. O. Livingston, Secretary and Sales Manager, Edwin T. Gorham, Superintendent, and Harrison L. Saunders, Representative.

The E. J. Woodison Company, Detroit, Michigan.

Fire Brick.

Represented by E. J. Woodison, President, E. B. Fleury, Toronto Manager, R. H. Mills, Ohio Representative, M. A. Bell, Michigan Representative, J. A. Disney, Canadian Representative.

E. J. Woodison, President: "I do not favor a permanent exhibition site, but a territory bounded by Pittsburgh in the East and Chicago in the West. The exhibition should be held in connection with the convention, as I consider the exhibition of secondary importance. This opinion I have formulated from interviews with convention goers of many years standing."

Wright Manufacturing Company, Lisbon, Ohio.

Chain Hoists, Electric Hoists, Trolleys, and Traveling Cranes.

Represented by H. H. Wright, President, C. F. Wright, R. C. Blair, and F. W. Henderson.

1. No. 3. Yes. 4. Jointly.

The Wyoming Shovel Works, Wyoming, Pennsylvania.

Molders' Shovels, Furnace Scoops.

Represented by G. E. Geer.

3. Yes. 4. Jointly.

THE CHICAGO SHOW

What a Practical Brass Foundry Superintendent Thought of the Affair.

By W. H. Parry.*

To those who did not go to the Chicago Foundry "Show," we "loosewads" who did can throw out our 6 x 9 inch chests and feel that, if we did spend a "couple of hundred" or so, we are amply repaid for the little "loose change" that we rid ourselves of, because of the many little pointers we picked up there.

From what we gathered, in conversation with quite a few of those in attendance, it is the rule that the concerns who *send* representatives to these conventions do not always "pay the piper" and, surprising though it may seem, the very firms who derive the most benefit from the visits paid to these exhibitions by their heads of departments are the last to consider the payment of the expenses incurred by these men, arguing, as some of them do, and which is correct, that their salary goes on just the same.

W. H. PARRY.

There was a time many years ago when a "good time" was all the visitors were looking for. But for some years now you will find 99 out of every 100 who make it their business to attend these shows are there for business reasons only. Any concern which has in its employ men whom they cannot trust out of their sight had far better dispense with their services than feel that they are apt to go astray when they attend the "Foundrymen's Show." The man who cannot control himself because he feels that he has a "free foot" for a few days in a strange town has not the makings of an executive in his carcass.

The show as a whole was a good one, covering, as it did, some 100,000 square feet, every inch of which was of some interest to the various callings to which such a show caters.

To the brass foundryman there were several exhibits that were of great interest, chief of which, I would say, was the several self-contained sand blasting machines that were shown. Each and every one of them is capable of thoroughly cleaning the most complicated castings in jig time, without so much as a speck of sand being spattered on one's person. This I regard as a great achievement, as it is mighty uncomfortable to feel that a human being's health is being injured by the use of an open sand blast nozzle, no matter how many dollars we may make in so doing. So that when we consider that there are now on the market, and were exhibited at this convention, machines that would handle a thousand pounds and more of small and medium sized castings in sealed and rotating chambers in from four to fifteen minutes, it is indeed a big step forward in foundry practice if only considered from a sanitary point of view, to say nothing of the economy and speed.

The molding machines of various makes were as ever a source of wonder to the newcomers, and I know of one of the biggest brass foundries in Pennsylvania that heretofore has not used one molding machine, is now, as a direct result of the visit of its manager and foundry foreman, going to equip its foundry in an up-to-date manner. To witness the delight shown by these two men when they saw what molding machines could do was well worth the trip to Chicago. Judging by their talk, it is an even bet that in their part of the country the news that the Civil War was actually an occurrence of the musty past is not generally known. The visitors were from all parts of the globe, some from far-away Australia; and one visitor from England was very anxious to see the cupola spout that rained beer for the thirsty, and was disconcerted to find that, while one exhibitor years ago was guilty of this practice, it had been so efficiently frowned down upon by the show managers that no one has dared to repeat the offense since. Or, indeed, any of a similar nature, as it must be borne in mind that these exhibitions are conducted on a very high plane and nothing is permitted to take place that would offend decent people, so that nobody need be in the least afraid to take the women folks there.

One of the most amusing features of all in connection with these shows are the many subterfuges that the numerous "souvenir hunters" resort to in making a collection of the knick knacks given away by the exhibitors. Persons, both male and female, who at other times always tell the truth lie most shamefully to gain possession of the trifles. I heard one indignant woman say, "Gracious me! you'd think they were giving away diamonds by their manner," though I noticed later that she was still on the hunt, and it had been a fairly successful one, judging by the numerous bundles she was carrying.

The sessions of the Institute of Metals were fairly well attended by those interested in the brass industry, yet the meetings were not all as well attended as they ought to have been, considering the splendid papers that were read and discussed there. Possibly the attractions at the show were responsible for this state of affairs. On the other hand, the attendance at the meetings of the American Foundrymen's Association was very flattering indeed, and our old friend, Dr. Moldenke, was in his element. When one considers the amount of work that devolves on both Secretary Corse and Dr. Moldenke, it does seem a pity that their efforts are not better rewarded, both in a financial sense and by attendance at meetings.

*Superintendent, National Meter Company, Brooklyn, N. Y.

ANCIENT INDUSTRY.

The gold beater's art is one of the oldest of the industries, and it is carried on today much the same as it was in ancient days, but a new process of making gold leaf has been recently introduced in England, which bids fair to make a revolution in art. In making these waferlike sheets by the new process a ring of aluminum about five feet in diameter and about five and a half inches in width is employed, and this is coated with a solution of gum, and after drying is dusted with some metallic powder in a thin layer. After this layer has been polished an electro deposit of nickel is made upon the polished layer of baser metal and gold is then electro deposited on the nickel. Each of the four layers is very thin, and the composite layer is said to be thinner than the ordinary gold leaf. When the formation of the leaf has been completed, the film is cut to expose the soluble base layer of gum and the ring is immersed in a solvent liquid which dissolves the gum and the metal film falls onto a band moving at the same rate as the ring, which last is rotated in the dissolving liquid, the film and paper being finally cut into book size.

A MODEL AUTOMOBILE FOUNDRY

A Description of the New Foundry of the Willys-Overland Company at Toledo, Ohio, Where Brass, Bronze and Aluminum Castings Are Made Under Ideal Conditions.

Referring first to the building design, the main foundry building, 100 x 300 feet, has 20 feet high side walls, an unusually wide and high monitor; all of the sash throughout the foundry plant are of steel and are operated so as to provide for the maximum of ventilation. The roof trusses span the foundry, there being no center columns. The interior of the buildings are painted a very light gray, and as a result of the design of the plant and painting, a very fine working light is obtained.

The furnace room, 54 feet square, has very high side walls with a square roof of very steep pitch rising to a square monitor. As a result, the furnace room is very cool and well ventilated. The arrangement of the plant is very good; the siding passes along the core room end of the building, providing for the delivery of sands and metals into their respective storages. The metal moves from the metal room through the furnace room and along to the trolley system to the various floors. The core room receives its core sand mixed from the core storage, the cores passing through to the foundry.

GENERAL VIEW OF THE FOUNDRY OF THE WILLYS-OVERLAND COMPANY, TOLEDO, OHIO.

It will be noted that the molding sand also moves easily to the molding floors and that the output of the foundry in castings moves naturally to the cleaning room at the end of the building and, after completion, to the proper departments of the manufacturing plant.

The furnace room is equipped with two gas fired tilting furnaces and eight gas fired pit type furnaces. The fifteen aluminum furnaces are the J. D. Smith Foundry & Supply Company, Cleveland, Ohio, make, gas fired, using a cast iron pot; a traveling jib crane, hand operated, is provided over the aluminum furnaces for placing and removing iron pots from the furnaces.

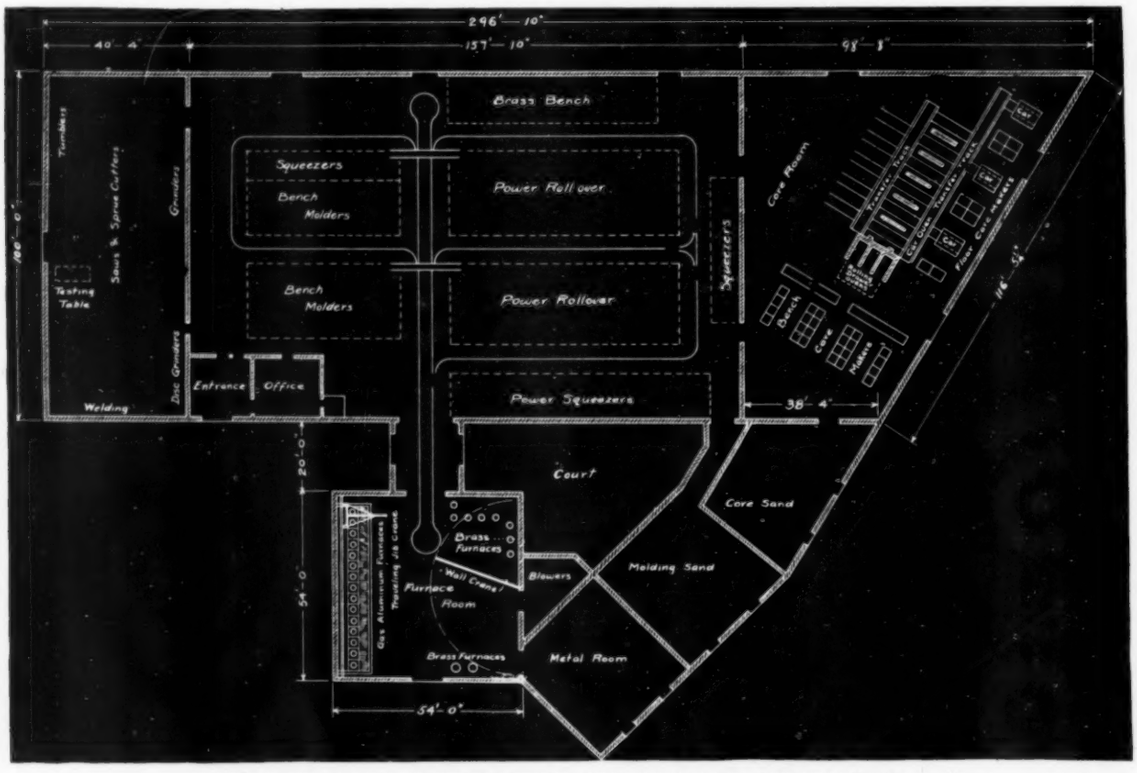
The pit brass furnaces are served by a wall crane with trolley and lever lifter. The core room oven equipment consists of three rolling drawer ovens and five car ovens of the through type, all fired by artificial gas.

It can be seen from the layout that the bench core makers work their cores through the rolling drawer ovens and thence to storage space near the molding floor. The floor core makers load the cars between working points, the cars then being transferred to any oven available and, after baking, pass out the opposite end of the ovens to the transfer car, to be placed on any track desired. A trolley system serves for handling metal from the furnace room to the various floors, for gathering up castings and for handling refuse. The cleaning room is equipped with grinders, band saws, sprue cutters and water tumblers.

A new feature is the disc grinding of certain aluminum castings, finishing them ready for use in the automobile. The finished water and exhaust manifolds pass to the testing table before leaving this department. The disc grinders and emery grinders are provided with an exhaust system for handling dust; the brass dust being heavier is not lifted to the dust collector, while the aluminum dust is, thus preventing a mixture of the brass and aluminum dust. The furnaces are operated by blowers placed in a small blower room and are motor driven. The entire foundry plant shows a remarkably fine layout in the arrangement of the various departments, a very logical movement of material through the different departments, one of the finest examples of building design we have ever seen and, with it all, the whole plant is an extremely sensible one.

The trolley system has a capacity of 1,000 lbs. and has an unusual feature in the use of a transfer bridge to provide for the quick and easy movement of material

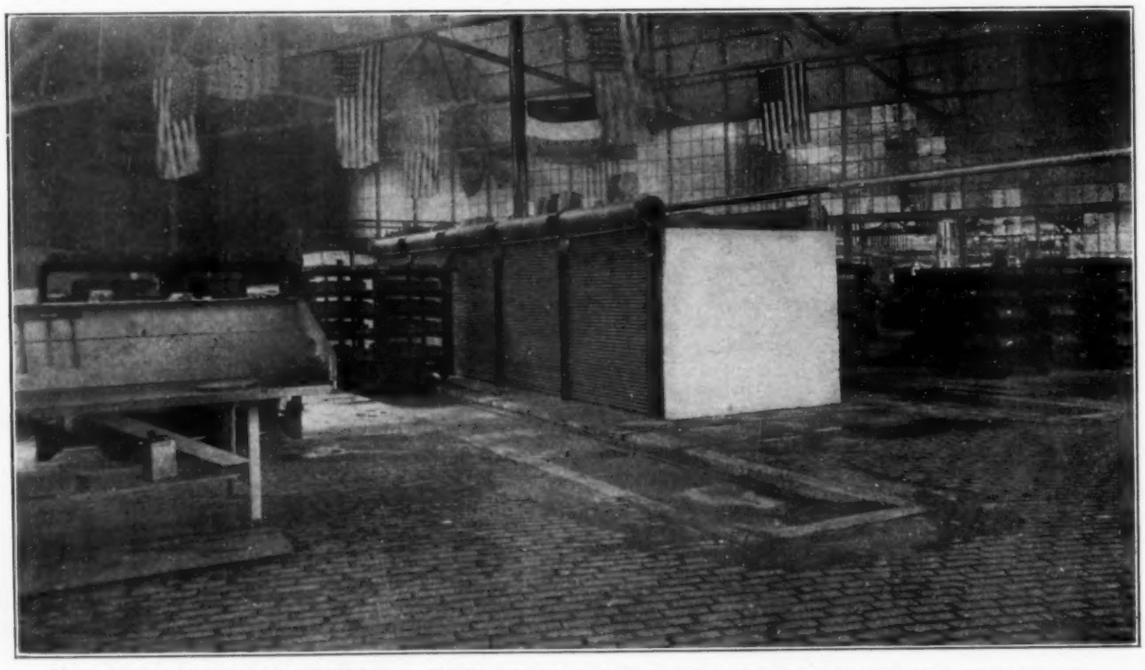
between the various tracks; the two loops at the end of the runway from the furnace room across the molding floors provide for the quick return of crucibles. The trolley system is suspended so as not to interfere with the aluminum furnaces, the trolley system with trays and dump buckets, water tumblers, sprue cutters and hand saws are installed by the J. D. Smith Foundry Supply Company, of Cleveland, Ohio.



PLAN VIEW OF THE WILLYS-OVERLAND FOUNDRY AT TOLEDO, OHIO.

light on the various floors and to cast as few shadows as possible; it will be noted from the photographs that the trolley system appears to be floating in mid-air. The oven equipment, the wall crane, trolley and lifter, the

The foundry of the Willys-Overland Company takes care of an output of 200 cars per day. There are 400 men employed. Thirty-eight thousand pounds of aluminum and five thousand of brass are melted daily.



CORE OVENS INSTALLED BY THE J. D. SMITH FOUNDRY AND SUPPLY COMPANY, CLEVELAND, OHIO, IN THE FOUNDRY OF THE WILLYS-OVERLAND COMPANY, TOLEDO, OHIO.

SPOTTING-OUT AND SILVER PLATING*

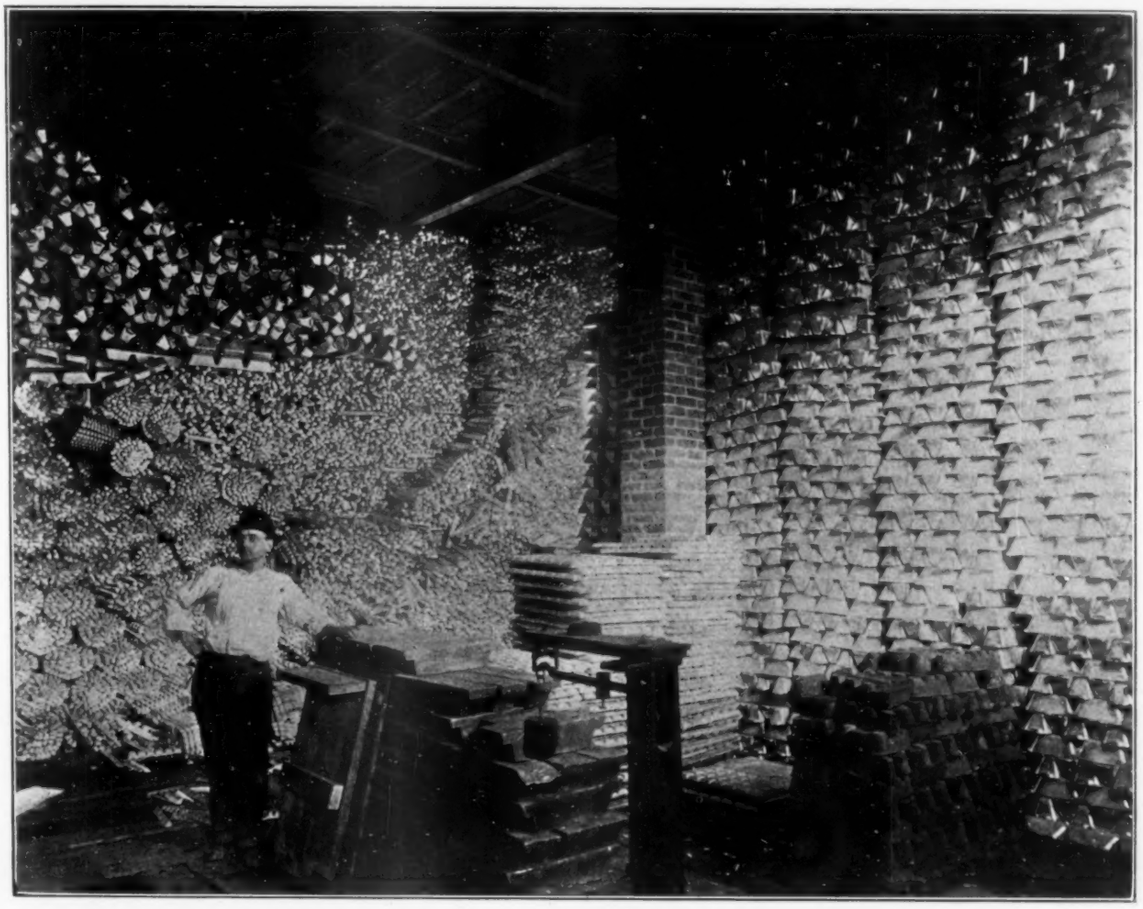
An Investigation into the Causes of This Troublesome Phenomenon and Some Suggestions for Its Prevention.

C. F. Burgess and L. T. Richardson.†

"Spotting-out" is one of the nightmares of the electroplater. Though one may seek long through scientific literature for a formal name and classification of this metallurgical disease, every practical worker can diagnose it at sight, though often unable to apply the perfect remedy. "Out damned spot" was never spoken with more emphasis on the stage than would express the emotions of the manufacture who, ambitious to put on the market a flawless product, finds his wares disfigured in some mysterious fashion.

Dampness in the atmosphere is an accelerating agent, and there are various factors in the manufacturing processes which may influence the degree to which the spots will develop.

Having had occasion to make a detailed study of this phenomenon, the writers are able to record certain data and information which may be of intrest to others, and they present it in the hope it may bring out discussion and additional information from those who have had more experience with the problem.



ALUMINUM STORE ROOM AT THE WILLYS-OVERLAND COMPANY'S FOUNDRY, TOLEDO, OHIO.

"Spotting-out," as the workers call it, may occur on almost any kind of plated surface, but it is with special reference to silver-plated ware that this paper deals.

When the silvered surface leaves the plating and polishing rooms it may by bright and flawless, but upon standing for some time exposed to the atmosphere it develops spots. Illustrations of this may be found by examining closely almost any silver plated reflector for electrical headlighs on automobiles. These spots appear as a whitish tarnish in circular or oblong form, and they may eventually develop far enough to interfere seriously, with not only the appearance but the efficiency of the reflecting surface.

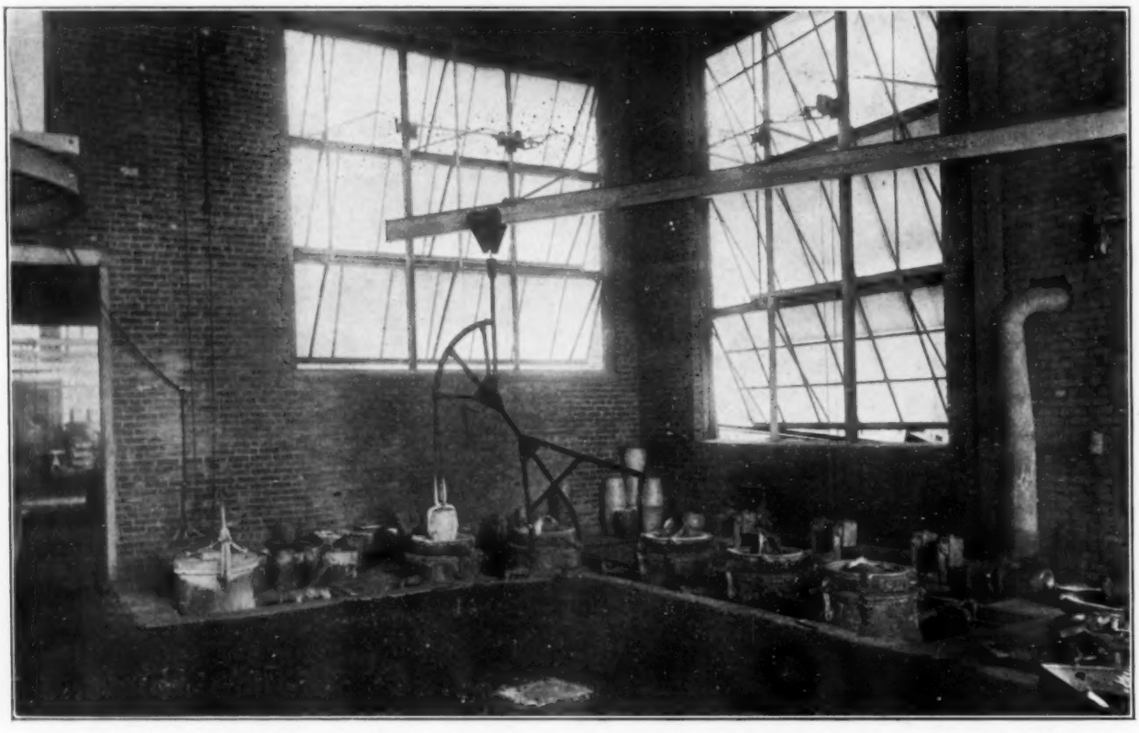
That much attention has been given it by practical platers is evidenced by numerous references found in publications such as The Metal Industry and other technical papers. Various views have been expressed. It is claimed by one authority that spotting-out is due to imperfections in the underlying metal, and more often to pitting due to gas bubbles at the cathode resulting from too high a current density or too much free cyanide or acid. Another writer states that it is due to the porosity of metal which absorbs the cyanide. It gives more trouble in summer than in winter. Another states that it is due to blisters from plating solutions too strong in cyanide. In fact, it is the general opinion that cavities due either to defects in the underlying metal or defects in the coatings which allow the inclusion of electrolyte constitute the cause of spotting.

*A paper presented at the annual meeting of the American Institute of Metals, October 13-17, 1913, Chicago, Ill.

†Northern Chemical Engineering Laboratories, Madison, Wis.

Among the remedies suggested are the following:

Subjecting the finished work to alternate hot and cold water, the contraction and expansion forcing the solution out of the cavities. Another recommends boiling after plating in a solution of argol, two ounces to the gallon, and then heating in an oven to 160 degrees, F., for several days. Another recommends washing and drying the articles thoroughly and then letting them remain unfinished for several days or weeks. Another recommends leaving the finished work for some weeks in a dry, hot atmosphere. In fact, the most generally recommended remedy appears to be the removal of the enclosed solutions by rinsing or long-time boiling in water. Various authorities deprecate the use of solutions which liberate gas at the cathode, and for silver plating caution against the use of too much free cyanide. Low current density appears to be advantageous.



POTS FOR MELTING BRONZE IN THE FOUNDRY OF THE WILLYS-OVERLAND COMPANY, TOLEDO, OHIO.

Various recommendations are found favoring the use of sodium salts instead of potassium on the basis of their lesser deliquescence. (This appears to be an erroneous impression, as will be pointed out later.) A question which is frequently debated is whether the cavities holding solutions are due to the imperfections of the brass, or to the methods of preparing the surfaces, or to defects in the electroplated coating. The natural tendency of human nature to throw responsibility for trouble on the shoulders of others, has given rise to some controversy between the plater and the brass manufacturer. The former asserts that pits and porosity of the underlying metal are responsible for flaws in the finished product, while the brassmaker asserts that the problem of preventing spots is up to the plater.

It is easy to see why in brass castings there may be pits and porous spots which in subsequent plating may be covered up and thus enclose solutions which would give rise to the later corrosion and discoloration, but it is not so easy to dispute the manufacturer of high-grade rolled sheet brass who asserts that the rolling and densifying mechanical processes to which his product is subjected precludes the existence of pits and porosity. He claims that even though there may have been a pit in the ingot, the rolling operation will gradually elongate and narrow it until it practically disappears.

A careful study was made of a certain high-grade quality of sheet brass to determine, if possible, the existence of pits or segregations which may have been the nucleus of spots on the silver plated surfaces. This study was largely carried out by means of the microscope. Many spots were examined microscopically and the surface was gradually polished down in progressive steps by a metallographic grinder. In most cases no defects in the underlying metal could be detected, but in at least one case it was possible to follow the defects down into the body of the brass. In this case there appeared to be a black material like a cinder imbedded in the softer metal. This explains the possibility of the existence of pits in rolled brass. There is no doubt that the rolling operations greatly limit the presence of pits or cavities, but it can be seen that a hard, brittle material imbedded in the soft metal may retain its original shape, even during the rolling operation, and on coming to the surface through polishing or grinding operations may be removed, thus leaving a cavity. As far as the writers have observed, however, this is an unusual occurrence.

A careful examination of spots shows that there are several varieties. due probably to different factors. They may have clearly defined outlines, they may be mere specks of cloudiness, or larger masses of whitish coloration merging gradually into the bright polished silver. Some spots attain their maximum growth and intensity within a few hours or days, while others appear to grow indefinitely. The discoloration is usually whitish, but it may also be gray or black, although there is a distinct difference between spots and tarnish such as is caused by atmospheric sulphur.

It was noted that by far the greater majority of spots

examined had a central point or nucleus which appeared as a perforation through the silver layer. Some of these could be observed by the naked eye, while others required the microscope to reveal them. Usually appearing through these spots is a growth of material of a black or greenish appearance. This sometimes takes a worm-like formation, growing a considerable distance from the central opening. The material constituting this growth appears to be deliquescent, attracting moisture, and on a damp day the drops of moisture surrounding these spots are readily discernible under the magnifying glass. It is where this condensation of moisture occurs that the discoloration apparently takes place, and explains why the spotting is much more in evidence in summer than in winter, due to the greater humidity of the atmosphere during warm weather. The material growing out of these perforations was insufficient in quantity to allow of the collection of an amount large enough for analysis. The appearance seemed to indicate the presence of copper and zinc compounds, and by means of applying a prepared filter paper a distinct test for cyanide was made in various cases.

By placing a drop of a cyanide solution on a silver surface a whitish discoloration takes place very similar in appearance to the spotting under investigation. This, together with the chemical evidence of cyanide, confirms the general belief that cyanide compounds are largely responsible for the spotting-out on silvered surfaces.

The formation of spots is easily explained on theoretical grounds, the explanation being similar to that for the pitting and rusting of iron. It is an electrochemical action. The brass and silver constitute an electrochemical couple, and the electrolyte enclosed in the cavity furnishes the additional element of an electrolytic cell. There may be electrochemical action whether or not there is a communication through the silver coating to the atmosphere. The presence of such communicating channel will greatly stimulate corrosion. The air furnishes the depolarizing agent which accelerates the electrochemical action. Since the copper and zinc of the brass are electropositive to silver, it is these materials which are corroded to form compounds and constituting the worm-like growths previously referred to.

It is evident that if the work be carefully dried, all of the moisture may be driven out of the cavity. No chemical action can then take place, as there is no electrolyte, but due to the deliquescent properties of the material in the cavity, this deficiency is quickly removed and the chemical action is started. Since the electrolyte may serve simply as a conducting medium and not necessarily be consumed as the underlying metal corrodes, it is possible that a very small amount of enclosed chemical may be responsible for a large amount of corrosion product.

The included chemical material may be from the pickling bath, the strike solution, or the regular plating solution. Although this material originally may be entirely covered by the plating metal, the perforation may be effected by the polishing operation or by the corrosion which forces its way through the silver surface. The cavities enclosing the solution may be exceedingly minute. Attempts to make artificial cavities by means of the point of the finest needle failed to give any results. Porosity in the brass may be present without showing itself under the microscope. By placing a small drop of hydrochloric acid solution on a brass surface the zinc is dissolved out, leaving a copper colored spot. This has a high degree of porosity, and various cases were noted where the presence of such copper spots produced spotting out on a silver plated surface.

TRIMMING ROOM OF THE FOUNDRY OF THE WILLYS-OVERLAND COMPANY, TOLEDO, OHIO.

THE NOMENCLATURE OF NON-FERROUS ALLOYS*

Dr. G. K. Burgess.†

Some Suggestions for the Standardizing of Names of the Metals and Alloys in Everyday Use.

We are witnessing an unprecedented activity in the development of the non-ferrous industries accompanied by the search, often rewarded with brilliant success, of new combinations of metals suitable for special uses. It is only very recently, however, comparatively speaking that the equilibrium diagrams of our most common alloys such as the simple brasses and bronzes have been established, and most, if not practically all, of the three-component systems to say nothing of the more complex ones, are still to be determined.

DISC GRINDERS FOR GRINDING ALUMINUM CASTINGS IN THE TRIMMING ROOM OF THE FOUNDRY OF THE WILLYS-OVERLAND COMPANY, TOLEDO, OHIO.

The art of preparing, mixing and applying them to industry in many cases, has preceded by centuries, the science of the constitution of the commoner non-ferrous alloys, and some of them possess names that date from times immemorial which no one would think of endeavoring to change—nor is this necessary.

The question arises, however—it has arisen before and been put aside as inopportune or hopeless of solution—whether it is not worth while, in view of the rapid development of special alloys to which are assigned a bewildering chaos of meaningless names, to endeavor to make provision for a more orderly naming of the non-ferrous alloys.

Imagine what would be the status of the nomenclature of organic chemistry today if there had been developed at an early date a rational system of naming in terms of the constituents based in part on the existing names of the more common organic compounds, and I think we should all agree that the complexity of organic chemistry is at least as great as that of the non-ferrous alloys.

In the realm of ferrous alloys and their naming, although there is some confusion, it is not nearly so bad as with the non-ferrous alloys. Some rational-minded person, or persons, started saying ferro-silicon, ferro-manganese, etc., and the force of a good example soon established the habit of this simple nomenclature which is being rationally extended by the more precise numerical defining of terms such as 40 ferro-silicon, 60 ferro-silicon, etc., to indicate the percentage of silicon or other element in the ferrous alloys. Such a numerical method has been tried in a few instances also for some of the non-ferrous alloys, for instance to indicate the nickel content in German silvers, but this practice is by no means generally in vogue in either realm.

We may cite another example—this time to avoid—from ferrous nomenclature, namely, the microscopic constituents, which, following the barbarous practice of the mineralogists, have been named after distinguished metallographists and metallurgists. These names were becoming of embarrassing number and beginning to create confusion as to their meaning and distinction, when the International Society of Testing Materials, at its Copenhagen meeting, endeavored to eliminate this confusion by reducing the number of terms used and defining them exactly. Fortunately, this phase of needless confusion and antiquated method of nomenclature of microscopic constituents has not yet arisen in the case of any of the non-ferrous alloys, and there is no reason why the mistake of such bad practice should be made a second time, since there are adequate names in the ordinary language of physical chemistry to provide for naming rationally all such constituents.

Personal and "coined" names have been used, however, quite extensively in naming particular non-ferrous alloys or classes of alloys having very distinctive properties.

*A paper presented at the annual meeting of the American Institute of Metals, October 13-17, 1913, Chicago, Ill.

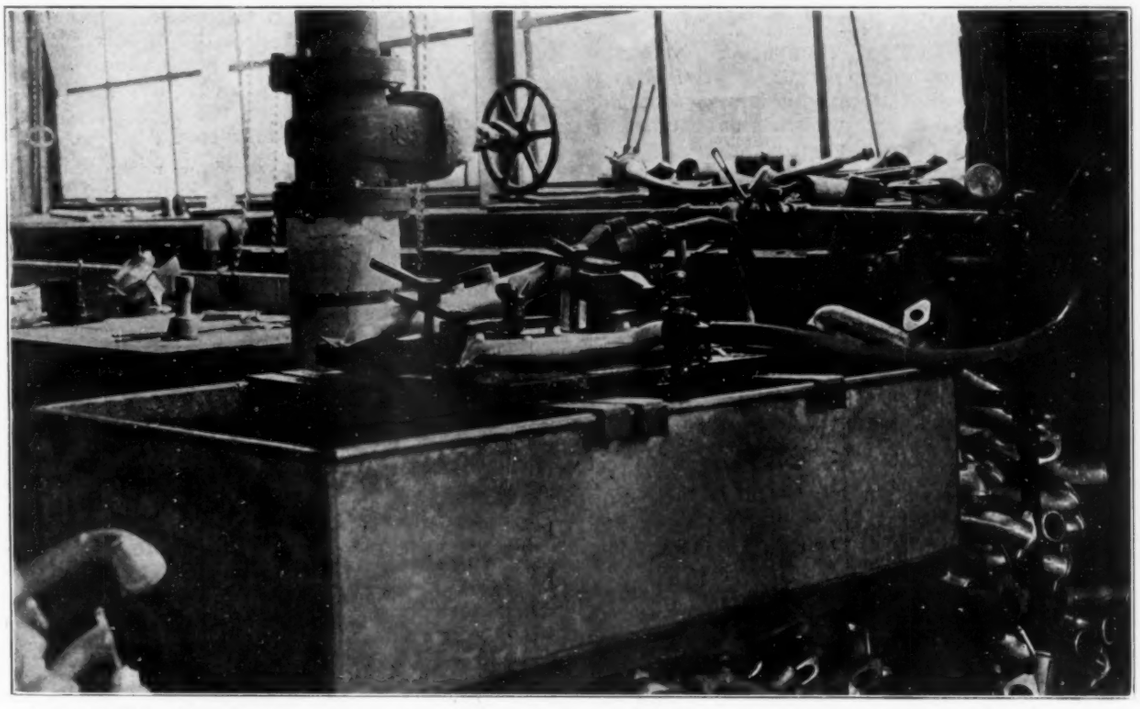
†Bureau of Standards.

The extent to which this practice should be encouraged in the future is a debatable question, but, anticipating the future in terms of the past, in those cases for which an alloy or group having sharply characteristic properties is discovered, particularly if it be of a very definite or of a somewhat complicated composition, there may be no great disadvantage, perhaps, in not entirely discouraging this practice of naming. Its great disadvantage over a rational system of naming is the tax on the memory as the number of such alloys multiply, and I believe that in general the practice of applying personal or "coined" names should be discouraged. Deliberately misnaming an alloy to give it a more valuable-sounding name, or for other purposes, it seems to me, should be emphatically frowned upon by such a Society as this. Such monstrosities as "manganese bronze"—to mention but one flagrant case—do not reflect credit on any technical body of men accepting them.

It is necessary, or, at least, highly desirable, if an effort is to be made to rationalize the naming of non-ferrous alloys, that there be co-operation on the part of several classes of persons, ranging on the one hand from the practical foundryman or manufacturer, to the scientific man, as represented by the physical chemist and metallographist, on the other hand, in order that a system of naming may be devised which will harmonize theory and present practice and provide adequately for the future.

No foundryman need fear that his empirical and convenient practice of numbering serially or otherwise labelling the alloys he makes, will be interfered with, as he is evidently free to adopt any system he pleases within his works. Nevertheless, a common system of naming, or identification and classification becomes imperative where several manufacturers are in competition; and it is furthermore evident that in drawing up or meeting specifications, a common language is equally desirable. Clear-cut definitions of alloys will serve oftentimes as a protection to the seller, and will aid the intelligent buyer. There is a gradual tendency towards uniformity in naming as the literature of the subject grows and becomes crystallized and new books on alloys appear, but this effect of written precedent permeates but slowly.

It is also evident that in framing a system of nomenclature, it would be advantageous to consider the desirability of fixing practical tolerances at least for some of the more common alloys and perhaps the principles on which such tolerances—or variations in the product from an accepted definition—can be worked out without too great difficulty. It is here that a knowledge of the equilibrium diagrams will be of the greatest importance, since for some alloys the division line between two adjacent phases having very different properties is very sharp, while for others there is a gradual transition in properties, with change in composition. It is evident that specifications for the composition of the latter type may be less rigid than for the former in the region of a dividing line between two phases. In a more refined non-ferrous metallurgical age, we shall undoubtedly see the manufacturing conditions and thermal treatment also specified with precision.



THE METHOD OF TESTING WATER MANIFOLDS IN THE ALUMINUM FOUNDRY OF THE WILLYS-OVERLAND COMPANY, TOLEDO, OHIO.

A derived question, but one that it might be well to consider in this connection, is the extent to which impurities or cheaper components in excess, shall be allowed in certain alloys and within what limits such alloys shall retain the simpler name to which they might be entitled.

I believe that the subject is of such great importance and has so many aspects—even including geographical—that I would advocate this society taking the initiative in America in the formation of a joint committee on non-ferrous nomenclature, comprising representatives from the interested societies in America, such as the American Institute of Metals, the A. S. T. M., the American Chemical Society, the American Institue of Mining Engineers and, eventually, the International Society of Testing Materials, as well as the British societies.

THE BRASS FOUNDRY OF THE FUTURE*

A Philosophical Review of the Present-day Foundry Conditions and Some Recommendations for Future Betterment.

By C. P. Karr.†

The brass foundry of the future can not be foretold with any degree of certainty without considering the status of the foundry as it is today and of making comparisons that are more or less indictments of present-day practices. In every large foundry where from one or more gates of similar patterns many castings are made, the tendency is to reproduce the product on a large scale. Match flasks, plastic molds and various other devices are made use of to economize in the cost of labor, to expedite the production, to insure avoidance of waste and to lessen unnecessary duplication; to this end, cranes and trolley tracks are installed in order to lift heavy charges and convey them quickly over great floor areas to their pouring destination; to promote their handling at the furnace mouth, lifting cranes, hoists, counterweighted furnace covers and various other devices are used to save time, to avoid loss in cooling and to lessen the hardships endured over hot fires and to eliminate close contact of the melter with his molten metal. Forced blast is employed to save time in melting and to increase the product per heat per man; to prepare the castings for their journey to the finishing shop, tumbling barrels, sand-blast apparatus, gate cutters or circular saws are used to effect a further saving of time and a reduction in the labor cost; everywhere machinery and more machinery of the most ingenious and expensive kind is installed to effect economies of cost and uniformity of production. In some shops everything is standardized but quality, quantity is supreme. Even the pattern shop in some cases is run on a semi-classified scientific basis to ensure uncertainty of selection and procrastination of action. Patterns that for ages have become shrouded with cobwebs and no longer fit even for a decent burial, are religiously preserved in some forgotten corner of the old style pattern shop; today they may be of some use; tomorrow they will be relegates to the junk heap. Today the whereabouts of a certain pattern, one it may be of 10,000, is known only to the mysterious memory of one man in custody of them, but tomorrow every pattern will be numbered, classified according to its usage or function, have its proper place in the thousand or more pigeon holes or cupboards or racks, be card indexed so that even the core-boy in the shop can instantly place his finger on any pattern that is wanted, especially if it be wanted in a hurry.

In the core-room the work is often done in a haphazard way, but tomorrow we shall find that the work has become highly specialized, some simple cores that are to be duplicated indefinitely are turned out in great quantities by suitable machines. In the molding department the old-fashioned bench molder who used to lord it over us all with his mysterious wrinkles, kinks and ultra-wise shakes of his owlish head, is fast becoming an interesting figure of the past, even a memory and nothing more, his importance has dwindled to a pitiful insignificance. For the tendency of the day is to adapt every pattern possible to the manipulations of the ubiquitous molding machine. Looking at the progressive foundry of today it would seem as though nothing more could be done by machinery to increase the efficiency of the output, its quality or its productive amount, but even in such a direction the future may have for us many a surprise in store, the development may take the shape of greater automatic action and simplicity. When we have reached such a parting of the ways, where are we to look for further improvement and higher efficiency with better quality of product and lessened cost of production?

The one element of this economical problem which has been studied the least of all in our constant endeavor to advance the art and the science of the foundry to its highest estate is in the one variable human unit of all foundry production, viz: the man behind all this intricate machinery, the dispenser of all these resources. It is difficult to say where we should begin such a consideration of this human unit; perhaps the simplest and most logical procedure would be to begin with the first operation of the molder himself and his choice of materials. First is his sand which offers a wide field of research and needs improvement. We have been accustomed to get the best natural molding sand offered in the open market and let it go at that, few of us have taken the pains to question its quality or adaptability to the ends we had in view. We look at the pattern, ascertain its purpose and judging some of us by intuitions, others by a rough rule of thumb, we direct the casting to be done in green sand, dry sand or loam, maybe, and pass it up to the molder. Then when failure comes we are surprised or claim that we are; if we have a sand that feels too loamy to our touch we may open it up with a mixture of pure quartz sand and give the confined gases a chance to escape, but how much shall we use, when shall we use it, how may we best disseminate the quartz sand through the loam, what is its temperature of vitrification? Few of us know. Experiment and investigation alone will answer such important questions, but if we are to avoid unsuccessful castings and consequent loss of time and labor, such questions must be answered right; the future foundryman will make it his economical business to answer them. Is his sand too dry or too wet, or has it been properly screened and tempered? At the present time the mighty but easy rule of thumb method prevails; in the future the expert founder will have somebody devise for him a simple cubic measure and balance to inform him as to these things; he will have at his beck and call some simple test which shall tell him at once whether he can go successfully ahead.

In drying his molds, today, the lower part of his drying stove has a red hot zone all the way around the lowest section; above, the iron shell is moderately hot, his drying temperatures throughout the vertical sections of his flasks are of variable degrees, as a result his molds are not uniformly dried out, what kind of castings has he a right to expect from such a means of drying? In the future he will have a drying oven maintained at a regular moderate temperature, a muffle oven if you will, provided with a self-recording pyrometer, a time clock to regulate the time of exposure and ensure a dry-skin over the entire face of the mold, or an electric oven heated to a constant temperature. In bench molding every motion of the

*Read at Chicago Convention of American Institute of Metals, October 13-17, 1913.

†Associate Physicist, Bureau of Standards, Pittsburgh, Pa.

molder is governed by the amount of personal skill he possesses, some of these men have a marvelous delicacy of touch and certainty of action and confidence of control; in the future greater skill may not be attained, only a more uniform result. He will become more adept in the use of his sand and perhaps more skillful in his use of cores. If he has to pour his own molds as today he generally does, the future will bring many changes. His judgment of the pouring heat as now generally practiced will be taken from him because the pyrometer will give him his pouring heat without dispute. His judgment as to how fast or slow, or uniform a charge must be poured will have to be a matter of personal skill and decision based upon past experience just as it is today, but the molder of the future will necessarily be a man of trained mind, ripened by study and observation, and his decision as to any course of procedure will be of more value to his employer than that of his fellow workman of today. He will also be a man of good personal habits, of clean living, well balanced thinking and vigorous health, because he will realize they are the necessary adjuncts to skillful molding. If such a man be a machine molder, he will make himself personally familiar with every lever, nut, bolt, screw, spring, cam and mechanical device of his machine, so that he can see at a glance whether his machine is working up to its best condition, even his ear will be trained to detect a discordant sound in the smoothly gliding noises which his machine might utter if something be awry, and in addition to this will have sufficient natural mechanical skill to take the entire complex mechanism apart and put it together again, if necessary, without the aid of the master machinist of the works. This suggestion may seem like stretching the point of departure from present-day practice a little too far, yet if any one will recall from his own personal experience what he knows of the vast amount of cheap and inexperienced labor that today is operating machines for molding in almost every shop in the land and then look at the product of such labor and count the vast losses thus entailed, the conclusion arrived at may not be so exaggerated as it seems.

In the future the premium system applied to the number of good castings produced by the machine molder will establish the point thus made. If the current practice of the shop is to have each molder pour his own work, then in addition to the mechanical qualifications thus stated, the successful molder of the future must in every sense of the word be a man, a man unafraid of personal danger, for every time a man pours a pot of metal into a mold he takes his own life and the lives of the men in his immediate vicinity into his own hands. Many of us have witnessed instances of personal heroism that would make the wildest romancer pale with envy, because the genius had not been vouchsafed to him to conceive of anything so noble and glorious. Second, the furnace man. As all of us know, the work of the modern foundry has become a matter of specialization to a startling degree. For example, the furnace man is second to the molder only in the order of his connection with the production of a casting, not second to him in order of importance; in fact it is hard to draw a line between them. Why should we? They co-ordinate each other so as to produce the curve of efficiency, if we may draw an illustration from the art of the metallographer.

Today, as a rule, the furnace man is simply a melter of scraps, a compounder of junk and any old metal that is wheeled up to him. He may have charge of a number of furnaces; these may be fired in various ways—all these furnaces and their devices look alike to him—his one task is to get his charge into the pots as fast as he can, run them down quickly, as soon as the last gate disappears, off comes the lid, up comes the pot, whisked onto the trolley and rushed to the molder who is waiting to fill his molds, and quite frequently, as some of us know, the pot-full of metal is sent indignantly back to him, too cold to pour, too thick, or something wrong about it. In it goes again to be soaked, oxidized by the gases of combustion, burned maybe, and out it comes again smoking hot and then it is poured. The amount of bad castings produced tells a story that needs no explanation.

The furnace man of the future will know about every mechanical appliance of his furnace as well, if not better than its manufacturer, and he will be quick to detect and avert every faulty working. He will know how to regulate his air pressure to his oil or gas supply so that his furnace will at every moment be working at its utmost efficiency; he will know how to hold his heat at almost a constant temperature when such a proceeding becomes necessary. He will become acquainted with the use of various pyrometers, be able to adjust and read them and interpret their results to aid him in the production of a superior metal. He will necessarily have had some chemical education and laboratory practice so that he may be able to flux his metal intelligently. He will also have a practical working knowledge of physical chemistry, know the difference between alpha and beta copper, so that the microstructure of a metal will not be a blank to him; he will have a knowledge of the gases of combustion, know how to determine them so that he may the more skillfully operate his furnace during the melting process. If he works in avery large foundry it will be incumbent on his employer to place him in the way of obtaining such information either by encouraging him to attend a night school where he may study the higher art of good foundry practice or conduct a school within the works for those who wish to attend.

To the furnace man of the future the metallurgy of the metals he uses will be neither a sealed book nor a lost art. The subject will possess for him a boundless fascination, the witchery of a tale that is never fully told, because the new art will never become trite for him, and the old will never lose its eternal charm.

In the core room of the future there will be, of course, embodied in its chief a fuller knowledge of core sands, a better knowledge of binders, a more complete comprehension of the absorption of gases, the retention of moisture by various sands, the ratio of voids to solids, the variation of specific gravities, a greater knowledge of plasticity, all tending to expand the coremaker's grasp of means to an end, virtually an applied science as well as a versatile art.

And last, but not least, the successful brass foundry of the future will be operated and controlled by a man versed in every correlated department of metallurgy applied to his field of endeavor, for metallurgists then as now will remain a highly specialized class of men, each working to the best of his ability to read the mysterious laws af nature and apply them the most profitably. Metallography, which now to many is nothing more than a mysterious confusion of lines, scratches and crystals, will in the future fall into lines of grace, imprints of a wider science and refulgent with a white light of knowledge. Great work for the foundry man has been done by the metallographer of today, but greater yet is to be done.

The foundry foreman of the future will not arrive at his final conclusions respecting the failure of his castings or be guided in his means of correction solely by tensile, compressive or hardness tests as we now know them, but will demand a series of metallographic tests, or perhaps make use of the spectroscope, dissociation and electrical tests of various sorts before there can be indicated to him the royal road to success. In that future day he will study not only the individual properties of each metal with which he is working, but more completely than we do now, he will ascertain what is the correlative action upon one another in varying proportions and submitted to various temperatures and pressures, melted perhaps under inert atmospheres, he will investigate their chemical action upon one another, also their inter-phase action, their crystallizing forces and catalytic transformations. All of such and kindred studies lead us rapidly and bewilderingly into the domain of the unknown.

He may then be able to solve some of the greatest problems which have baffled the most learned metallurgists of our day, viz: those of liquation and segregation; he may be putting together metals of varying degrees of liquation and segregation with different powers of solvency in such a way that both chemical and physical equilibrium may be restored and that these proportions may be reciprocally varied at will, and in connection with proper heat treatment—all internal stresses may be balanced and uniformity of molecular structure be obtained.

The success of the brass foundry of the future will depend more upon the training of the man in physical and metallurgical science and his ability to apply his knowledge than upon the machinery employed, desirable though it may be as an accessory to facilitate the produtcion of his castings. In other words, the greatest possible factor for success lies in the development of the man himself.

NEW METHOD OF "GALVANIZING"

By Dr. Robert Grimshaw.

Until recently it has been possible to "galvanize" one metal by the use of another dry pulverized metal only when the latter was electro-negative to the former, so that the process was limited to tin, white metal, silver, mercury, copper and gold. The finer metal to be deposited was employed in the form of a salt from which it was deposited on the baser metals, by the action of the latter or by the help of pulverized metallic zinc.

The galvanic deposition of electro-positive metals, however—as, for instance, copper and tin—is most important in many arts; a good example being the deposition of tin in soldering and of nickel for decorative and protective purposes.

More recently, however, it has been found possible to use the metal which is to be deposited, in its elementary form, in connection with a salt which acts, when moist, as an electrolyte, an electro-positive metal, and certain materials which prevent mutual action of the electroplating mixture before it is desired that they shall affect each other. In this process it is important that no materials shall be present which would hinder the action of the electro-positive metal during the process of application of the mixture by friction, by so acting on this metal as to produce a metallic salt before it could have time to act electro-positively.

The advantages attained by this new plating process consist in the fact that thereby almost any metal can be deposited upon almost any other, so that the minor industries, as well as the household, machine builders, etc., are made independent of the regular electro-plating establishments, and that the new compound which is applied by simple rubbing on, is durable and hence may be kept in stock until needed. The mixture is said to be non-poisonous and free from salts which would act injuriously upon the metals; also it is claimed that no previous chemical cleaning or preparatory galvanic coating is necessary—which, however, the present writer begs to doubt.

There is necessary but one operation and one mixture; all that is required being to moisten the material and apply it intimately to the surface to be plated. The electro-positive metal forms the anode, the article to be plated the cathode. As neutral substance tending to keep the moisture dry there may be used talc or soapstone. It is also desirable in many cases to protect the electro-positive metal from oxidation; this is effected by the use of paraffin wax, rosin, naphtalin, or some other neutral material applied in solution in an easily vaporized diluent. In rubbing on the powder this neutral material is removed by the mere mechanical action of friction. To delay the action of the two metals upon each other, tallow may be used.

Of the various metals which may be practically deposited, magnesium is the most electro-positive; but in some cases, also, such metals may be deposited as are only slightly electro-positive—as, for instance, zinc. The most frequently deposited metals are nickel, silver, cadmium and tin and their alloys.

The choice of the electro-positive which serves as an alloy depends naturally upon the one on which the deposit is to be made; for instance, zinc can be used for plating nickel on iron or steel, but in general not for depositing copper or brass, whereas, on the other hand, magnesium serves for all metals.

To deposit zinc, which itself is strongly electro-positive, the reagents must consist of the metal in its elementary state, and of a salt, as, for instance, ammonium chloride or sulphate.

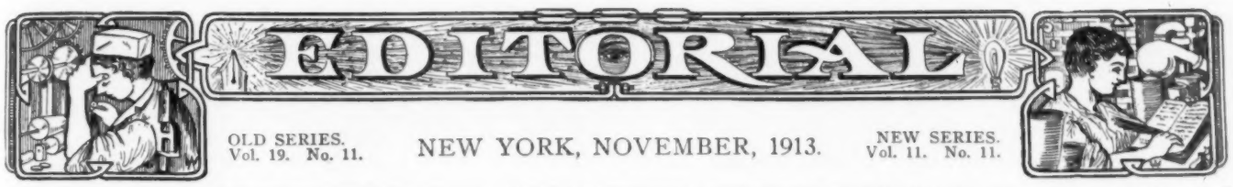
As regards the salts which are to be used, those of ammonium are the most generally available; double salts can also be used. Such salts have an especially strong action because in their decomposition ammonia is set free, which then in the nascent state acts, in connection with the water, upon any grease which may be present on the surface to be plated, and cleans the latter. Also, sulphuric acid in being set free from sulphates, acts by removing other impurities as, for instance, oxide.

The powder may also contain polishing material, as chalk or talc—the latter being the better of the two, because it prevents the absorption of moisture.

As an example, here is the mixture for depositing zinc:

	Parts by weight.	Appr. %
Zinc dust (commercial)	15	45
Ammonium sulphate	5	15
Magnesium	1	3
Chalk	10	30
Soapstone	2.5	7.5
	33.5	100.5

Ordinary commercial zinc serves very well, although it contains considerable oxide and impurities. Only pure metal is deposited; the impurities remain unattached.



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THE METAL INDUSTRY

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THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

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THE FOUNDRYMEN'S CONVENTION

The 1913 convention of foundrymen held at Chicago October 14 to 17 was, like its predecessors a great success. The various committees in charge of the affair should be congratulated for the able way in which the programme as outlined in the opening pages of this issue of THE METAL INDUSTRY was carried out. The various meetings were held in spacious halls where there was no disturbing element, and the papers read were attentively listened to, while the discussions were interesting and enthusiastic. The committee on papers should be especially commended for the excellent quality of the papers presented.

The reports of the two Government Bureaus that are working in harmony with a committee of the American Institute of Metals are voluminous and interesting. It is plain to be seen that the foundry industry will ultimately be greatly benefited by the work of the Bureau of Mines in furnaces and pyrometers, while the Bureau of Standards will certainly produce valuable data relating to standard test bars and methods of analysis. One problem which was taken up and which certainly needs solving, that of the proper nomenclature of the non-ferrous metals and alloys has long been an eyesore in the metallurgical field. Right here THE METAL INDUSTRY would offer a suggestion to abolish the word NON-FERROUS in connection with the metals other than iron or steel. Iron and steel constitute a class by themselves, and all the others can consistently be classed as METALS. The American Institute of Metals, like its sister society, the Institute of Metals of Great Britain, does not use the word NON-FERROUS, yet it is well known that neither society covers iron or steel in its deliberations, so it seems to us that the problem mentioned could well be termed "THE NOMENCLATURE OF METALS."

Another important move by the Institute of Metals was the suggestion that at future meetings some selected problem or topic be assigned for each meeting and, this having been done in advance, the members can come prepared to state their experiences and views, and the discussion ensuing will then produce valuable data for immediate use and for future reference. The practical foundry man has plenty of everyday problems that he would like to get light on, and by having some of these brought up for discussion at the meetings he would get the knowledge he is seeking. Some of these problems would be, for instance, How to use deoxidizers in the foundry, or How to figure mixtures of metals and how to control them. These are problems which can be solved without the use of the phase rule or equilibrium diagram, and do not require a study of alpha and beta crystallization!

Among the papers read at Chicago and which elicited no discussion, due no doubt to the absence of practical platers, was one by Dr. Burgess on "THE SPOTTING OUT OF SILVER AND ITS REMEDY." We publish this paper in this issue of THE METAL INDUSTRY, and we hope that all manufacturers and users of sheet brass will read it. The subject of spotting out of brass after plating has long been a cause of contention between brass manufacturer and consumer, and sheet brass has generally been believed to be in fault. The information given in Dr. Burgess' paper is most enlightening on this point, and we think it goes a long way in clearing up a perplexing problem.

To find a suitable convention city and convention hall for next year seems to be the problem that is left over from the Chicago convention. There are plenty of cities which are hungry for conventions, but there are few of them which have the right sort of buildings to house the present proportions of the annual exhibition of the Foundry & Machine Exhibition Company. The Chicago Amphitheatre having been found so spacious and commodious for handling the entire exhibition there naturally followed a movement to hold the convention every year in that building.

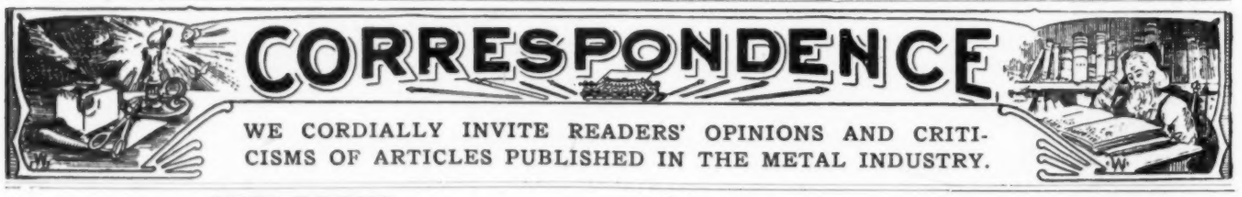
The idea, however, did not seem to take root with all of the exhibitors and the executive committee of the exhibition company thereupon passed a resolution to hold the exhibitions alternately in the eastern and western sections of the country, provided they could obtain suitable accommodations. A committee was named to visit at once the East and look over the possible ground. This committee has already visited the East and will report within a month to the joint committees.

In the meantime, in order to get from the exhibitors an impartial expression of opinion on the subject, THE METAL INDUSTRY has inquired of each exhibitor his preferences for 1914 and these preferences are published in our report of the proceedings of the convention. The reports indicate that out of 90 exhibitors who expressed their wishes, 50 favor a different city each year, 22 prefer Chicago every year and 10 gave special reasons about exhibiting in different localities. The remaining 8 exhibitors did not send a signed reply, but from what information the representatives of THE METAL INDUSTRY gathered at the convention hall, the majority of the exhibitors spoken to preferred each year a different section of the country.

This desire for a moving feast makes the problem rather difficult of solution for the joint committees, but it is probable that with their skill and experience they will find a way out of the difficulty to the satisfaction of all concerned.

Another question which has arisen is whether the exhibition company and the allied foundrymen's associations should continue to hold joint conventions. In the past these joint affairs have been very beneficial to each organization, but the question arising is, whether one or both had outgrown the other and was the commercial exhibition company to eclipse, so to speak, the educational, foundry and metal associations?

THE METAL INDUSTRY believes that each organization is still more or less dependent upon the other for a successful convention and exhibition, and that the most satisfactory arrangement was when the meetings and exhibition were held under the same roof, with a noise-proof partition between the two, or in adjoining buildings. At Chicago the meetings and show were forty minutes from each other and rather an uncomfortable car ride between the hotel centers and the Amphitheatre, which meant that the entire morning or afternoon would be used up in attempting to attend either. By bringing nearer together these two attractions, both would probably benefit, and by the application of harmony between the exhibition company and the associations—each working for the success of the entire convention, educational and commercial—general satisfaction would be the final accomplishment of this great annual event of the foundry and metal trades.



NEW BOOKS

ELECTRO-DEPOSITION OF METALS. By Dr. George Langbein, with additions by Wm. T. Brannt. Seventh edition revised and enlarged. Size 6½ x 9½ inches. 720 pages, 155 illustrations. Bound in cloth. Published by Henry Carey Baird & Company, Philadelphia, Pa. Price, $5. For sale by THE METAL INDUSTRY.

In the seventh American edition of Dr. Langbein's excellent work which is now presented to the public, the general scheme and scope of the sixth edition has been retained, but a thorough revision has been made and a good deal of new matter has been added. It would be difficult to state in detail just what the new additions consist of, but a perusal of the book will show that each chapter has undergone considerable change and new and late improvements, in the way of apparatus, processes, and methods have been inserted so that the work as a whole is now most complete and makes a valuable guide for the every day plater. Due attention has been paid to all important innovations and it has been the aim of the authors to include all practical methods of plating which have become known since the publication of the sixth edition as well as descriptions of the most recent machinery and apparatus. This new edition of Langbein's in common with former ones is a work which should be included in the library of every plater, chemist and manufacturing concern that is at all interested in the finishing of metal products.

OXIDIZING STEEL

TO THE EDITOR OF THE METAL INDUSTRY:

Kindly allow me the space to correct a statement made by Mr. Chas. H. Proctor in his article on oxidizing steel, appearing in the August issue of THE METAL INDUSTRY. Mr. Proctor states that "there are only two cold methods that can be used in oxidizing steel." The two methods mentioned by Mr. Proctor are copper plating and oxidizing, and black nickeling. How about the thousands of edged tools put on the market with a black finish? This finish is the black oxide of iron and is produced by a cold method, or otherwise the temper of the tool would be destroyed. It is used extensively on chisels, hatchets, draw knives and similar goods. The finish was described by "Ionic" in THE METAL INDUSTRY for October, 1910. If one objects to copper plating and forming the sulphide of copper, there are still other methods that can be used; such, for instance, as nickel plating lightly and coloring in an arsenic solution.

Burlington, Vt., October 9, 1913. E. BLASSETT, JR.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

THE METAL INDUSTRY has had so many inquiries in reference to shop problems that have been previously published that it is deemed advisable in future to number each question. Since the inception of the department of Shop Problems 1,882 questions and answers have been published, without taking account of the many answered direct and by mail.—Ed.

ALLOYING

1,883.

Q.—Will you furnish us with the necessary formula for gilding metal used in alloying gold.

A.—The composition of gilding metal consists of 83 parts of copper and 17 parts of pure Bertha spelter. To produce this alloy the copper is first melted and while in that state covered with fine charcoal. The zinc is then added and the mixture thoroughly stirred. To produce the granular form of the metal suitable for alloying it is poured into cold water from sufficient height and in a steady stream.—C. H. P.

BLUEING

1,884.

Q.—I would like to know if you can give me any information, or in anyway help me out of my trouble in blueing steel in a solution of salt petre and black oxide of maganese. The trouble we experience is that the blue rubs off easy.

A.—To endeavor to overcome your difficulty in blueing the revolver parts, we suggest the following:

(1) After the parts have been washed in benzine, rinse them in a final dip of clean benzine kept especially for the purpose. (2) Do not allow your sawdust to become impregnated with the benzine in evaporating out, this means oil in the sawdust, which may be the cause of the trouble. Avoid greasy fingers in handling the cleansed barrels. (3) Use clean running hot water for rinsing. Avoid the use of stagnant water. (4) Dispense with the use of soda water for a time, this may reduce the oxide formed. (5) In drying out try the use of boiling water to which is added 1 to 2 ounces of Swan and Finch's platers compound to each gallon of water. (6) Arrange to heat the barrels and parts to 250 to 300 degrees before immersion in the potassium nitrate.

By following these suggestions your trouble should be overcome. We might state that in the production of royal copper the same method is used, but no manganese is used and the same difficulty is frequently experienced due to the oxidization from finger marks. To overcome this trouble articles for royal copper are very thinly coated in a lead bath arranged as a plating bath and made up from acetate of lead or litharge and caustic soda. The slight film of lead prevents superficial oxidization of the copper surface and enables the potassium nitrate to act evenly over the surface of the metal.—C. H. P.

BRONZING

1,885.

Q.—Can you inform us how to produce the finish on bronze metal same as enclosed sample.

A.—This finish is commonly termed chocolate bronze and is produced in the following manner:

Remove all burrs and polish the coating with 160 or 180 emery; then lightly sand blast the surface, cleanse and copper plate preferably in an acid copper bath for a short time. Remove, wash in clean water and immerse in a solution of sulphide of barium using ½ ounce to each gallon of water, until the color is a dark gun metal tone; then remove wash in clean water, dry out carefully in maple sawdust and then scratch brush lightly using a soft brass wire scratch brush, one that has been used considerably. Lacquer with transparent lacquer. It is customary to tone the lacquers for such finishes with aniline colors according to the shade of the metal when finished. —C. H. P.

BURNISHING

1,886.

Q.—In your May issue there is an article on refinishing motor lamp reflectors. Would you be kind enough to let me know how I can burnish them by power? Are they burnished on a lathe, if so how and what sort of chuck, and how are they held in the chuck. Are they burnished by or with water, etc., what shape stone to use, and do you mop them up with rouge?

A.—In answer to your various questions we suggest the following:

First.—The reflectors can be burnished by power by using a chuck made from mahogany wood, so that the reflectors may be set in. The chuck should be made so that a strong nipple can be secured to the chuck and suitably threaded, so that it can be screwed to a lathe, or a hub should be turned upon the chuck and threaded for the same purpose. Friction holds the reflectors in the chuck.

Second.—Use agate or bloodstone burnishing tools with a strong soap solution as the burnishing medium. The tools should have a half rounded surface with a blunt end.

Third.—For a high lustre the reflectors should be mopped up with alcohol and rouge after burnishing.—C. H. P.

CEMENTING

1,887.

Q.—Will you please advise me what kind of cement to use that will hold rubber to metal (aluminum)? The cement must be quick drying.

A.—A cement that is used by the United States Government may answer your purpose. This consists of glycerine and litharge (oxide of lead). To prepare this cement place sufficient glycerine in a glass or porcelain receptacle and then add the litharge by sprinkling in. This gives a better mixture. The amount of litharge to use will have to be determined by experiment. This cement is absolutely waterproof and dries quite rapidly. A low heat may be used to assist in drying.

A cement that gives excellent results for the purpose mentioned consists in preparing a thin solution of carriage makers or cologne glue by dissolving the glue in hot water; then add sufficient finely sifted wood ashes to produce a plastic cement. Use this cement warm.

Another cement that will unite most anything to rubber consists of the following proportions:

India rubber in small shreds	25	ozs.
Rosin	3¾	"
Orange shellac	2½	"

Then add sufficient carbon bisulphide to produce a plastic cement. It is advisable to use a gentle heat in mixing this cement as the materials become better incorporated under the influence of heat.—C. H. P.

DRYING

1,888.

Q.—Will you kindly furnish me with a solution for drying off iron or steel that has been pickled in muriatic acid so that it will not rust while drying.

A.—To overcome the difficulty you experience in the rusting of iron and steel after pickling we would suggest the following:

After rinsing in water immerse in a solution of lime water. This may be prepared by adding ½ pound of lime to a gallon of water. The lime should be previously slacked. Rewash and immerse the articles in boiling water to which is added two to four ounces of platers' compound to each gallon of water. This immersion will coat the surface with an invisible film of grease that will prevent rusting, and assist in drying, providing the water is maintained near the boiling point.

Use the old fashioned platers' compound, known as whale oil soap. This can be purchased from Swan & Finch, New York.—C. H. P.

ETCHING

1,889.

Q.—We are having considerable trouble in etching graduation marks on a brass casting which forms part of an apparatus made by our company. The method we are following is to clean the part with gasolene and cover with an asphaltum coating, having first ground and polished the surface. We mark the lines through the asphaltum coating by means of a special engraving machine and etch with a solution of two parts nitric acid and one of water. The graduations are approximately 1/16 in. apart. Our trouble seems to be that the acid works in under the asphaltum coating on each side of the lines, resulting in uneven or too wide graduations. We are not sure that we are using the right acid for etching, or the coating we are using is the best. Any information you can give to help us out will be appreciated, as we are spoiling a large percentage of the parts working under present conditions.

A.—For etching on brass a satisfactory ground can be made from equal parts of beeswax, burgundy pitch and asphaltum. These constituents are melted together and thoroughly stirred in order to secure a uniform mixture. This is warmed before using and spread evenly over the surface that is to be etched. After the ground has had time to cool it is removed from those sections of the metal that are to be etched, after which the etching fluid is applied.

A satisfactory etching fluid is composed of one part nitric acid to three parts water after the biting has been completed, which takes only a few minutes, the work is dipped in hot water to take off the acid. The surface of the work can then be cleaned by wiping with a cloth saturated with gasolene or benzine. In order to obtain satisfactory work be sure the articles are clean.—P. W. B.

ELECTRICAL

1,890.

Q.—Can you advise me whether there should be a switchboard on the negative wire?

A.—Theoretically and practically, according to measurements made under various conditions, it makes no difference whether the rheostat or switchboard is placed in the positive or negative circuit. Some platers prefer the negative, while others the positive circuit. Practical preference should be given to the positive circuit, providing the contacts between the anode and the anode rods are kept perfectly clean so that the flow of the electric current is the same through every anode.—C. H. P.

FLUXING

1,891.

Q.—We should esteem it a great favor if you would give us a formula for a good aluminum welding flux.

A.—A soldering flux for aluminum that can be used with tin as the solder or any of the other solder combinations consists of the following:

Stearic acid	65 parts
Mutton tallow	20 "
Lard	5 "
Glycerine	5 "
Paraffin	5 "

The above ingredients should be mixed thoroughly by the aid of heat and should be used when cold.—C. H. P.

GILDING

1,892.

Q.—Will you kindly give a formula for a 14-K. gold solution to be used in a jewelry repair shop?

A.—The most satisfactory 14-K. gold solutions are those that are prepared by what is termed the porous cell method. This consists of preparing a solution of cyanide in water, usually about three ounces or more to the gallon. Arrange as a plating bath and connect a gold anode of the alloy required to the positive pole. Now procure a porus cell from an old dry battery, drill holes in the extreme outer edges and secure pieces of copper wire in the holes to support the cell on the negative rod. Fill the porous cell two-thirds full of hot water and dissolve one to two ounces of cyanide in it; hang in the solution previously prepared and support upon the negative pole as mentioned.

Now take an old dry battery carbon and cleanse well and secure to the binding screw a piece of copper wire then connect to the negative pole and immerse in the porous cell. Use a current of three volts or more to reduce the gold from the anode in solution which should be previously weighed to determine the amount dissolved, which should not be less than 10 pennyweights per gallon.

To prepare a 14-K. solution by the usual method prepare a solution consisting of the following:

Water	1 gal.
Cyanide	5 ozs.
Chloride of gold	10 pennyweights
Bisulphite of soda	1 oz.

This will give you a yellow gold.

To produce the 14-K. shade dissolve ½ ounce of carbonate of copper and 1 ounce of cyanide in ½ pint of water and when dissolved add proportionately to the gold solution to produce the shade required. Use a voltage of from two to three volts and a hot solution temperature of from 160 to 180 degrees.—C. H. P.

OXIDIZING

1,893.

Q.—Kindly publish a formula for the intense black shadows on oxidized silver work. We have tried adding a little .880 liquid ammonia to the regular liver of sulphur dip, and have also used this at different temperatures and for different periods of immersion, but the black color we get turns to quite a gray obscure tone on scratch brushing with a soft wire brush.

A.—To produce the intense black shadows upon oxidized silver work the articles after silver plating should be lightly polished on a soft buff or mop, using rouge and alcohol as the polishing medium. Afterwards cleanse the surface and coat for a second or two with copper in a cyanide of copper solution, then wash and immerse in a cold liver of sulphur solution until a deep black is produced, remove wash, dry and repolish lightly. This will produce an intense black tint. Afterwards relieve to produce your spots or shadows.—C. H. P.

STRIPPING

1,894.

Q.—Please give me a formula for a good cyanide stripping solution for taking silver off of hollow thin brass tubing, and whether it would affect the brazed points of same.

A.—Prepare a fairly concentrated solution of ferro cyanide of potassium and arrange as a plating solution, using three poles. The outer poles should be connected with the negative current and sheets of iron should be used as the cathodes. The centre pole should be connected with the positive current to which the tubes are connected. By using a fairly strong current the silver should be readily removed.—C. H. P.

Q.—Please give me a formula for stripping nickel off of steel surgical instruments.

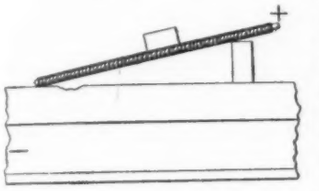
A.—Prepare a solution in the same manner as stated above, but use potassium cyanide with a reversed current. This will remove the nickel without affecting the iron.—C. H. P.

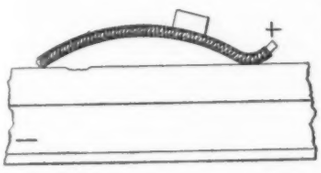
PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,073,543. September 16, 1913. **Electric Deposition of Metals by Fusion.** A. P. Strohmeager, Westminster, London, England. Assignor to Slaughter and Company.

This invention relates to processes in which an electric current is employed to fuse a metal electrode so that the fused metal is deposited upon a metal surface or surfaces which are thereby welded or patched. According to this invention the electrode which is coated with insulating material is pressed down upon the work, as shown in cut, by a weight or its equivalent so that throughout the process the bared end of the electrode is in contact with the work.

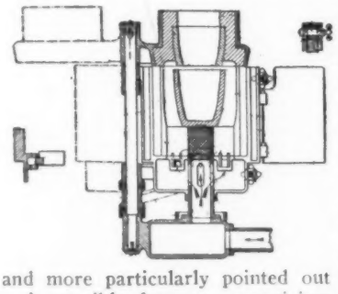




The electrode may be made in the shape of a bow or arch or may be straight in which case one end will be separated from the work by a distance piece. The insulating material which the inventor prefers to use is asbestos spun into the form of yarn and smeared with a suitable composition such as sodium silicate, aluminum silicate and the like to vary the fusing temperature of the yarn.

1,073,912. September 23, 1913. **Crucible Furnace.** Hans Koch, of Dietikon, Zurich, Switzerland.

One of the objects of this invention is to provide a crucible furnace wherein the furnace structure is formed in sections and mounted to be swung into a position to surround the crucible and also away from the crucible so as to leave the latter free to be removed by the usual form of carrier, thereby avoiding the employment of lifting tongs.



The invention has further features of novelty which are shown in the accompanying drawing and more particularly pointed out in the appended claim.

A crucible furnace comprising in combination, a crucible support, a crucible mounted on said support, companion furnace sections having furnace chamber portions adapted to register and horizontal removable grate portions adapted to register, and hinged supporting means for said sections whereby the same may be swung into and out of surrounding relation with respect to said crucible, substantially as described.

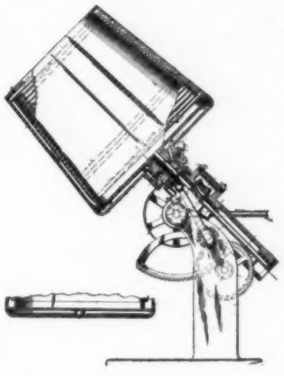
1,075,143. October 7, 1913. **Process of Producing White Lead.** Edwin Euston, St. Louis, Mo.

This invention relates to a process of producing white lead, the object being to provide a new and easily practised method whereby white lead of the best quality can be easily, cheaply, and rapidly produced.

Mr. Euston has discovered that by separately preparing and subsequently mixing together the relatively bulky basic carbonate of lead precipitated by carbon dioxide gas from a lead acetate solution maintained alkaline and the relatively dense more highly carbonated precipitate obtained by continuing the action of carbon dioxide gas on lead acetate solution until of acid reaction to litmus, a pigment is obtained having opacity, whiteness, spreading and brushing qualities in every way equal to the best known commercial grades of white lead.

1,073,945. September 23, 1913. **Tumbling Barrel.** Frederick E. Warner, Bridgeport, Conn.

The main object of the present invention is to provide a superior means for heating a tumbling barrel; to so construct such means that it will clear itself of condensed steam; and also to provide steam-connections which will allow the barrel to be tilted as may be desired, while the steam is still on, and this without the use of rubber hose or the like.

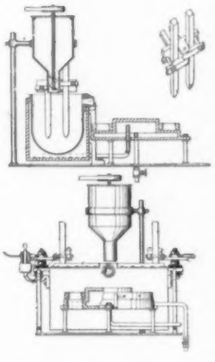


The barrel is covered by the following claim:

In a machine of the class described, the combination of a barrel having spaced inner and outer walls; a supporting shaft to which said barrel is connected; means for rotating said shaft and the barrel; means for tilting the shaft and the barrel carried thereby; a continuous pipe coil surrounding the inner wall of the barrel; a stationary steam collar surrounding said shaft and having grooves concentric with the axis of said shaft which are always in steam tight communication with the respective open ends of said coil; steam supply and exhaust pipes opening into said grooves; inlet and exhaust mains; and swivel connections between said mains and pipes and in line with the axis about which said tilting is effected.

1,074,408. September 30, 1913. **Apparatus for Fusing Electrotypes.** Hector Russell Carveth, of Niagara Falls, N. Y., assignor to the Roessler & Hasslacher Chemical Company, of New York, N. Y., a corporation of New York.

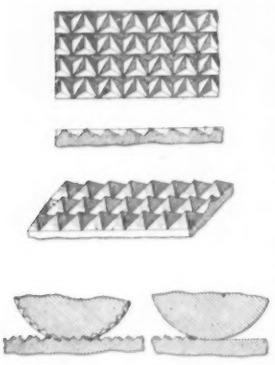
This invention relates generically to an apparatus in which an electrolyte may be fused by the agency of an electric current passed through it and specifically to certain improvements the inventor has made in such apparatus as shown in cut to render the same more successful, efficient and economical in commercial operation.



To overcome the difficulties encountered with fused inorganic compounds the inventor has devised an apparatus in which the electrodes and electrode connections are so designed that the adjustment or removal of electrodes is permitted without interruption of the current or of any operation of the fusion furnace. By this means the process of fusion may be maintained without interruption, whereas with any other method an interruption would have to be made every few hours. He has also found it necessary to be able to vary the amount of electrical energy consumed in the melting pot and to control it both in regard to the total amount of heat supplied to the fused bath and in regard to the current density at the electrodes. This control is obtained by adjusting the electrodes as above mentioned, by varying the depth and other dimensions of the bath and by proper regulation of the current in the supply circuit outside of the bath.

1,074,824. October 7, 1913. **Means for Densifying Metallic Surfaces.** T. L. O. Wadsworth, Sewickley, Pa.

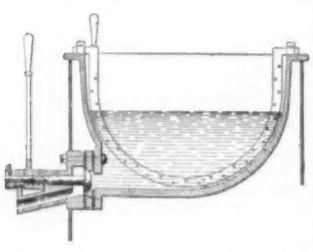
The invention relates to the densification of the surface portions of metallic articles, and has for its object the provision of improved means for effecting such densification, and in more thorough and efficient manner.



The surfaces of metallic articles have heretofore been densified by first rolling upon said surfaces closely arranged projections and depressions, and then rolling down the roughened surfaces between smooth rolls. The rolls for roughening the surfaces of the metal piece have usually been marked by cutting their operating surfaces in annular grooves and cross-grooves, thus forming upon them a multiple of projections of a quadrilateral cross-section. By marking the rolls as shown in cut the expense of marking is reduced, the pattern is more durable, and a more effective and thorough densification of the product is attained.

1,074,901. October 7, 1913. **Melting and Casting Pot.** Thomas C. Sheehan, of Jersey City, New Jersey, assignor, by Mesne assignments, to Automatic Furnace Company, of New York, N. Y., a corporation of New York.

This invention relates to a casting apparatus for casting slugs or pigs adapted to be employed in linotype or monotype casting machines and the like.

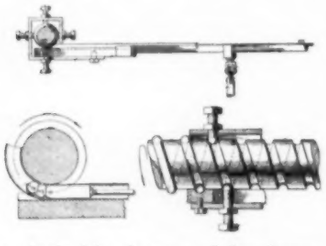


The principal objects of the invention are to provide efficient and convenient means for drawing away the products of combustion and the gases from the molten metal, for stirring or puddling the molten metal when desired, for drawing off the metal from the pot in the desired quantities, and generally to improve and simplify apparatus of this character.

1,075,045. October 7, 1913. **Tube-Coiling Machine.** Joseph E. Lewis, Baltimore, Md.

This invention relates to that class of tube-coiling machines wherein the tube is wound upon a spirally grooved former, but may be used for bending generally.

The machine shown in cut embodies certain improvements which result in the following advantages: (a) the work is done much more rapidly than heretofore, thus greatly reducing the cost; (b) perfect coils are made without the use of any filling material in the tube; (c) coils may be wound to form spirals of smaller diameter than by the usual method, and this result is accomplished without collapsing or wrinkling the tubes; (d) the metal is properly worked or stretched in the bending process, thereby imparting to the same a desirable degree of hardness or temper, so that the finished coils are not easily dented or distorted by subsequent handling.



1,075,583. October 14, 1913. **Molten Bath and Means for Coating Iron Articles Therewith.** H. J. Lohmann, Jersey City, N. J., Assignor to Lohmann Company, New York.

The object of the present invention is to produce a homogeneous molten bath of lead and zinc for coating iron articles by immersion therein.

It is well known that lead has the property of resisting corrosive vapors and mineral acids which zinc is quite incapable of resisting, but zinc has heretofore been used almost exclusively as a metal coating for iron articles, because in a molten state the lead could not be kept in a homogeneous mixture therewith.

Heretofore, when lead and zinc have been mixed in a molten bath, the zinc has floated upon the surface and iron articles dipped therein were coated solely with zinc, as the contact of the zinc first with the articles serves to cover them and protect them from the adhesion of the lead. This result followed from the much greater specific gravity of the lead which ordinarily prevents the two metals from mixing in a melting pot.

The inventor has discovered that the occasional placing in the melting pot of a small amount of mercury will maintain a homogeneous mixture of the lead and zinc, and that iron articles dipped in such a bath become coated with the mixed metals in the desired proportions. The mercury produces such effects if used in the proportion of less than one-tenth of one per cent. of the weight of the bath, and its effect is doubtless due to the great diffusibility of the mercury in such a molten bath and its property of amalgamating with the fluid metals and attracting or cementing them together so as to overcome the influence of gravity. This effect is produced in spite of the fact that the mercury is volatile and gradually dissipated from the bath.

1,075,661. October 14, 1913. **Lead Alloy.** C. P. McConnell, New York, Assignor to Western Electric Company, New York.

The subject of this invention is a lead alloy particularly suitable as the material for so-called "tape" used for winding electrical conductors such as telephone switchboard cables, although said alloy may be used for other purposes.

The claims are:

1. An alloy composed of 93.25 to 96.75 per cent. lead, 3 to 6 per cent. antimony, and .25 to .75 of one per cent. tin.

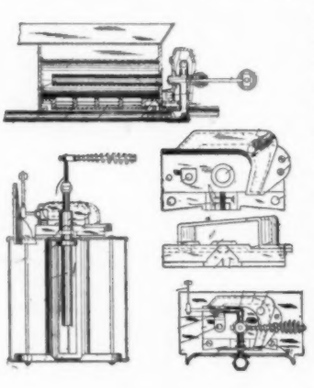
2. An alloy composed of, approximately, 95 per cent. lead, 4.5 per cent. antimony, and .5 of one per cent. tin.

3. As an article of manufacture a thin metallic tape for winding electrical conductors composed of an alloy of approximately 95 per cent. lead, 4.5 per cent. antimony and .5 of one per cent. of tin.

1,075,757. October 14, 1913. **Soldering Furnace.** E. T. Burgess, Columbus, O.

This invention pertains to soldering furnaces and is particularly applicable to that type of furnace known as a soldering furnace.

The primary principle of the invention resides in the provision of a structure of furnace, as shown in cut, wherein the fuel conducting conduit is heated for the vaporization of the fuel prior to its delivery to the burner, but, particularly, the invention rests in the provision of a means for heating the fuel conducting conduit at the proximate point of admission of the fuel to the burner. In the effectuation of this result, the inventor desirably utilizes a pilot flame which is normally maintained for the purpose of lighting the burner at any time and which while being maintained, effectually heats the fuel conduit near the juncture thereof with the burner.



The invention further relates to the provision of means for insuring the lighting of the burner from the pilot flame and in the particular construction producing this result.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

SOME NEW AND INTERESTING FOUNDRY DEVICES SHOWN AT THE CHICAGO EXHIBITION OF THE FOUNDRY AND MACHINE EXHIBITION COMPANY.

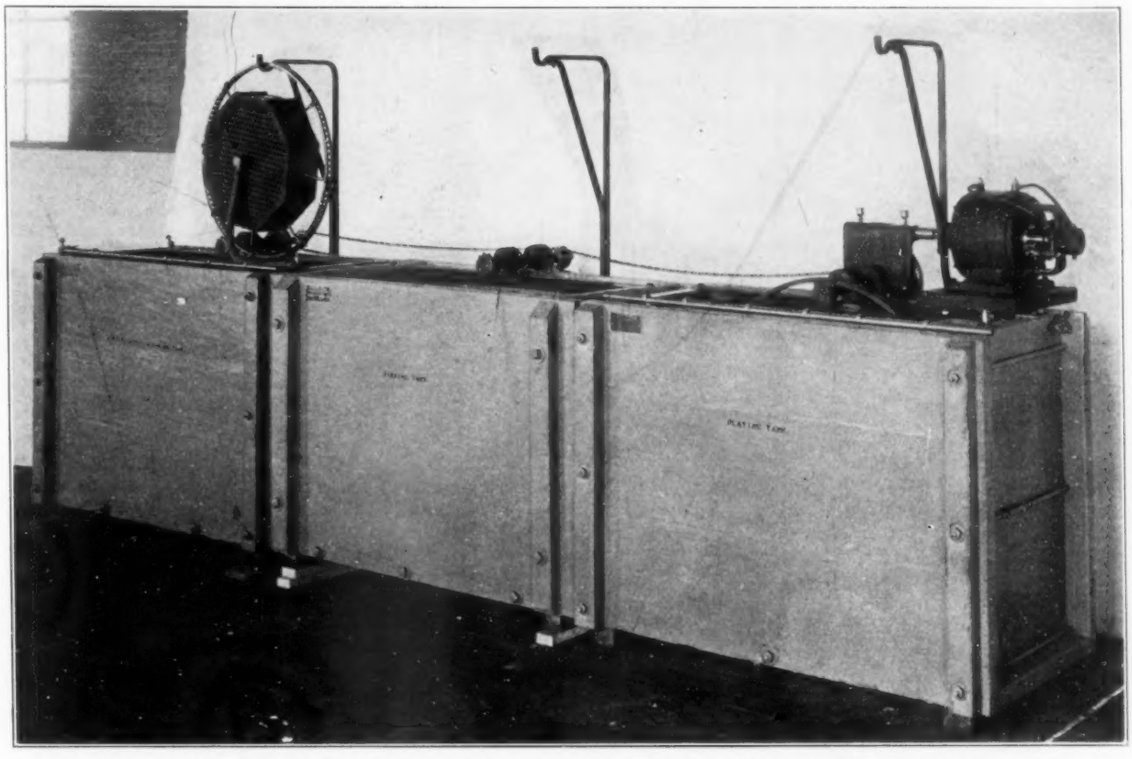
MECHANICAL PLATING DEVICE

This mechanical plating device was shown by Bennett-O'Connell Company, of Chicago, and is a departure from all other mechanical plating devices which are in use at the present time. The device consists, as shown in cut, of three open tanks with the basket as shown suspended just above the cold electric cleaning tank. The objects or work to be plated are placed in the rotating basket and then suspended on the rotating sprocket as shown in the accompanying cut in the cold electric cleaning tank. They are left in this tank, which cleans the work thoroughly in from 5 to 10 minutes, depending entirely on the condition of the work before placing the same in the tank. From there the basket is removed and placed in the rinsing tank for 1 to 2 minutes, and from there it is transferred to the plating tank as shown by the accompanying cut.

By this means of cleaning, rinsing and plating it is only necessary to handle the work once, as it will be thoroughly cleaned in the cold electric cleaner, rinsed and plated before removing the work from the basket. Heretofore it has been necessary in all mechanical plating devices to first prepare the work before placing the same in the baskets before plating. With this system they claim to save time and labor and are able to turn out the work much quicker and at a considerable reduction in cost.

To operate this mechanical plating barrel, it is said, requires less voltage and less current than in any other plating device known, for no current is lost in connections or rods, as the current is applied directly to the anodes as well as the plating basket without having any exposed metal surfaces in contact with the current.

The efficiency of this mechanical plating device is claimed to be very high on account of not having any losses in making connections from the anode and also to the basket, which would form a circuit to convey the current as is necessary in nearly all other mechanical devices on the market to-day.



THE BENNETT-O'CONNELL MECHANICAL PLATING DEVICE SHOWN AT CHICAGO FOR THE FIRST TIME.

Another feature of this device pointed out by the manufacturers is that it does not require more than 6 volts and, therefore, only requires one-half the amperes that are required in other mechanical devices for mechanical plating. This makes a saving of 50 per cent. in current consumed, as heretofore it has always been customary to use from 8 to 12 volts in mechanical plating barrels to do satisfactory work in a reasonable length of time, but with the low voltage and one-half the current they are able to turn out work in 50 per cent. of the time required in other mechanical plating devices. Further information may be had by corresponding with the Bennett-O'Connell Company, Chicago, Ill

SELF-CONTAINED SAND BLAST BARREL

The New Haven Sand Blast Company, New Haven, Conn., showed their barrel, which is claimed to be the only genuine self-contained sand blast, that is, where the cleaning material does not leave the inside, but is used over and over on the work. The accumulation of dust and dirt from the castings is confined inside the machine and removed by a direct exhaust from the barrel, which is said to be the only practical way.

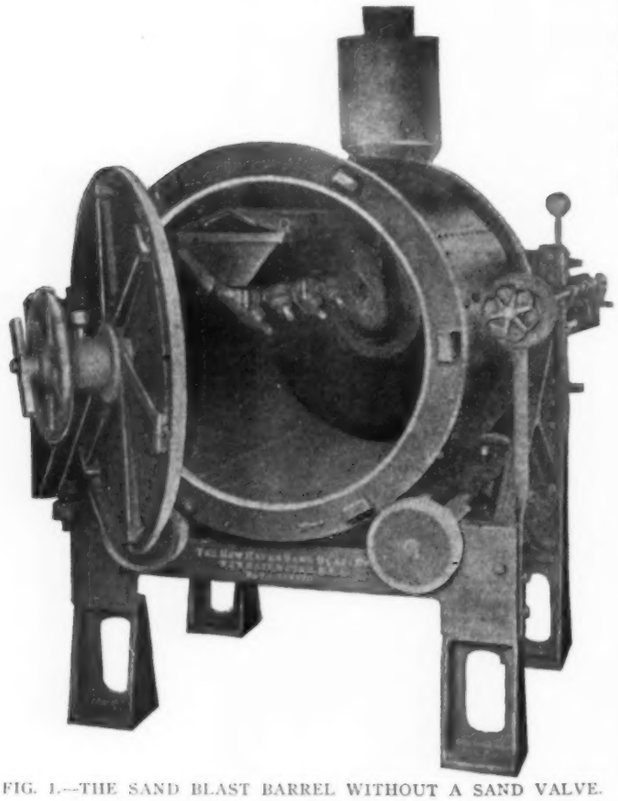


FIG. 1.—THE SAND BLAST BARREL WITHOUT A SAND VALVE.

One of the principal features of this sand blast machine is that there is no sand valve on it which must be continually operated, consequently there is nothing to get out of order. The mixing chamber is so designed as to admit a certain amount of cleaning material at a time and until after the abrasive inside the chamber has been removed by air pressure no more can enter even if the sand control be left wide open.

The second cut (Fig. 2) shows this simple construction of the mixing chamber, which is shown in the sectional view with hose connection removed, the interchangeable lining chamber in position, and sand entering side ports in the position it retains at all times. These machines are fully described in a new catalogue M, just issued, which may be had upon request.

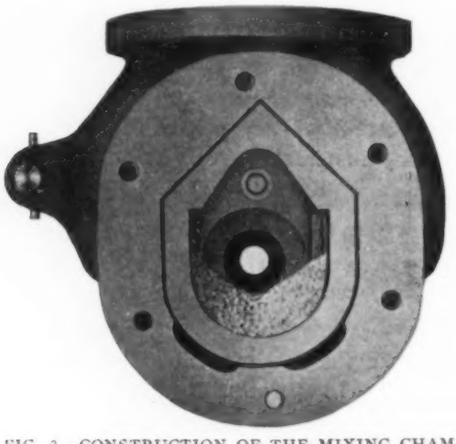


FIG. 2.—CONSTRUCTION OF THE MIXING CHAMBER. NEW HAVEN SAND BLAST COMPANY'S SAND BLAST.

EVANS HIGH PRESSURE SAND BLAST

The sand blast shown in the cut is called the Evans High Pressure Sand Blast, and is manufactured by the Carter Metals Cleaning Company, Philadelphia, Pa. The makers say about this machine:

"The economy and efficiency in the use of the Evans High Pressure Sand Blast makes it an indispensable tool for cleaning castings, metal plates, etc. Not only is it economical in the use of air, using only 69 feet at 80, 76 feet at 90 and 83 feet at 100 pounds, but in the necessary horse power for operating. The machine requires only 12½ horse power at 80, 15 horse power at 90 and 17½ horse power at 100 pounds pressure.

THE EVANS HIGH PRESSURE SAND BLAST.

"By the use of a cock on the air inlet to the mixing chamber the amount of sand used can be so regulated that the highest efficiency can be obtained with the greatest economy in sand. The nozzle is of a very simple construction and so made that the few wearing parts can quickly and easily be replaced when worn out. The machine itself is an air receiver. The water caused by the compressed air falls to the bottom of the tank. The machine will never clog owing to dampness in the machine and will always work providing dry sand is placed in the sand hopper."

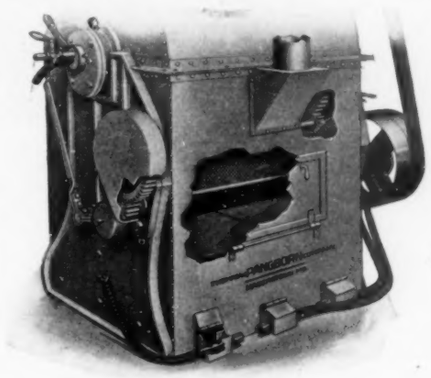
ALLEN SOLDERING SPECIALTIES

L. B. Allen & Company, of Chicago, Ill., are now putting on the market a line of soldering specialties under the name of Allen Soldering Specialties. This line includes soldering sticks, which are claimed not to corrode or injure in any way surfaces to which they are applied. This is also put up in the form of a paste which answers the same purpose as the stick and which makes solder dipped into it self-fluxing. Soldering salts and soldering liquid, which is especially adapted to galvanized iron and steel. Quite a unique product which the Allen company manufactures is the soldering liquid fountain brushes, which makes an ideal tool for the solder man. It has a flat bottom to stand up on and a hook to hang it up on pocket, belt or wire. Another form of Allen

solder is Presto-Solder, which will make any kind of an electrical contact quickly and satsfactorily, all that is needed to do is to apply the heat. These compounds are being distributed by the Hanson & Van Winkle Company, manufacturers of electro plating chemicals and equipment, Chicago, Ill.

PANGBORN SAND BLAST BARREL

The barrel shown in the cuts is manufactured by the Pangborn Corporation, sand blast specialists, Hagerstown, Md. The distinctive features of this barrel are first—the perfectly round shape of the manifold containing the nozzles, which, running through the center of the barrel, brings the nozzles at the proper distance from the work and still leaves a clear



THE PANGBORN SAND BLAST.

space around the periphery of the drum, thus eliminating the possibility of pieces clogging or jamming inside the barrel and causing damage.

Second—The sand feeding mechanism is all outside of and at the rear of the barrel, where it can be constantly observed and any choking or clogging of the nozzles immediately seen and corrected.

Third—By reason of the in-swinging door the cleaned material can be delivered to the floor, box, truck or barrow, by rotating the barrel and requiring no handling, raking or fishing.

The barrel shown at Chicago was the No. 4, which carries four nozzles and has maximum capacity of 1,100 pounds to a

THE WORK FINISHED AND READY TO BE TAKEN OUT.

charge and the manufacturers state that the barrel is adaptable to the cleaning of all metals, being equally efficient on steel and malleable iron as on grey iron and brass.

ALBANY SAND AND SUPPLY COMPANY

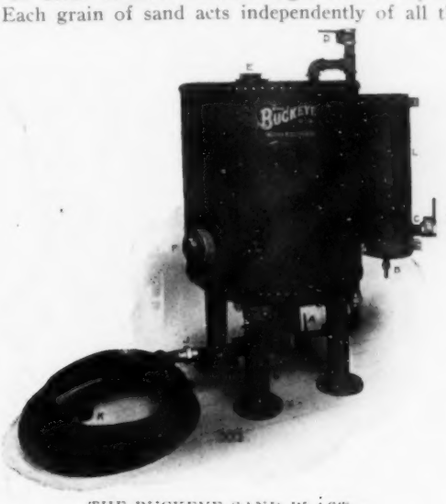
The booth of this company attracted considerable attention due to the fine, smooth castings shown in a stove made by the Walker and Pratt Manufacturing Company by the use of sand produced and graded by the Albany Company.

In addition to their high grade sand product, the company had an extensive exhibition of Stephenson Bar belt dressing, as made by Samuel Stephenson at Albany for 30 years and for which the sand company have become distributor. Many exhibitors using belting had failed to think of a belt dressing and the company generously provided all that was needed. In addition to a thousand samples of belt dressing, the company gave all visitors a folding ruler with the parcel post regulations and other interesting matter. The Albany Sand and Supply Company was represented by the treasurer, A. T. Palmer, and two salesmen; C. H. Bird and S. Marshall.

BUCKEYE SAND BLAST

The cut shows the standard design sand blast machine of a thousand pounds capacity and larger manufactured by Walter MacLeod & Co., Cincinnati, Ohio. This machine has a tank built of heavy steel plates and strongly riveted. All of the parts are of extra thickness and strength to withstand the wear and tear that a sand blast gets in actual practice.

The operation consists of throwing a stream of rapidly moving sand or other abrasive material against the object to be treated. Each grain of sand acts independently of all the rest,

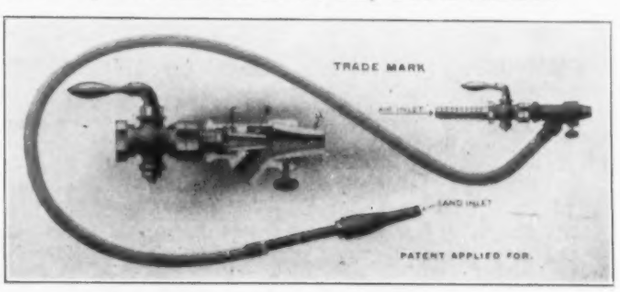


THE BUCKEYE SAND BLAST.

but every grain acts alike in producing a result uniform in depth and roughness. The sand used is on an average of 1-50 of an inch in diameter and is propelled by a pressure of from 30 to 40 pounds. The fineness of the sand used will vary according to the results desired and the nature or character of the work. The sand should be hard and tough, dried and allowed to cool before using, otherwise it is liable to steam or condense. For general work a good gritty sand or fine gravel that will pass through a number six mesh is particularly recommended. These machines are described in catalogue section No. 50-M, which will be sent upon request.

CYCLONE SUCTION SAND BLAST NOZZLE

W. F. Stodder, Syracuse, N. Y., exhibited his Cyclone suction sand blast nozzle, which is designed primarily to take the place of the expensive tank and outfit usually used in foundries.



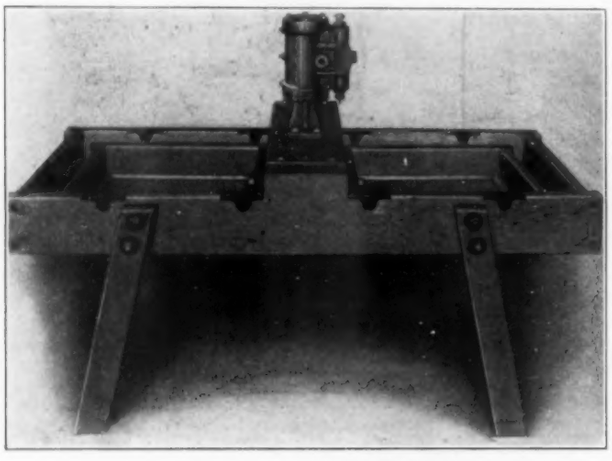
THE CYCLONE SUCTION SAND BLAST NOZZLE.

He claims for the apparatus that it saves a large initial cost, is cheaper to operate in air consumption and takes less time on account of its lightness and ease of operation. There is no sand tank to fill and it does not get out of order, while the up-keep is

practically nothing. The work can be stopped at the nozzle. He claims the cost of refurnishing sand blast hose used on other makes of sand blasts is more than the cost of a cyclone suction sand blast nozzle outfit complete. No expensive sand hose, as there is very little wear, for the sand only travels slowly through the hose. All grades of sand can be used, but the best results are obtained by using a good, hard, washed quartz, or silica sand, dried and screened through a six-mesh for general work. Eight or ten-mesh for fine work. Catalogue M will be sent upon request.

THE DUPLEX SAND SIFTER

The illustration shows the new Duplex Sand Sifter of the Battle Creek Sand Sifter Company, Battle Creek, Mich., designed to handle even more sand than their Simplex Sifter. Foundry operators will appreciate this machine, as two grades of sand can be handled at the same operation. It can be regulated by the throttle valve to run fast or slow as desired. In construction, only the very best of material and workmanship are employed throughout. The sifters are built to stand the hard use in the foundry without getting out of order. They are light in weight and can be readily moved to any part of the foundry with ease. There are few wearing parts and nothing to get out



DUPLEX SAND SIFTER.

of order. The screens travel in opposite directions, causing the machine to sit still on the floor.

The capacity of each screen is 50 per cent. larger than an 18 inch foundry riddle, and the improved iron bound screens are easily removed for cleaning and changing. The air engine is large and the perfectly balanced air valve is claimed to be the best governing element on the market to-day. In this machine the makers are able to furnish 50 per cent. larger capacity at about half the price other makes are sold for.

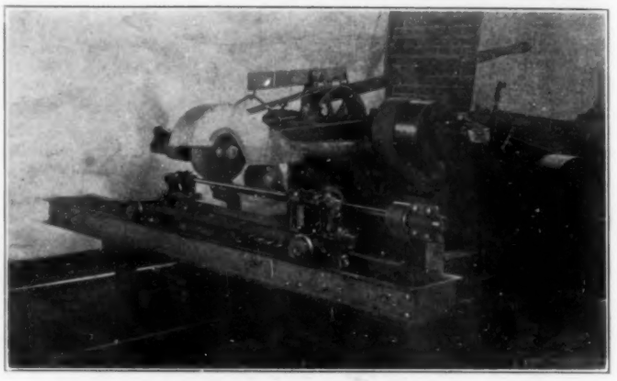
Four screens are furnished with each machine, two ¼ inch mesh, two 1-3 inch mesh, or, if desired, they can furnish ½ inch or ⅛ inch mesh in place of the above, and for very fine work, such as flour, they can furnish 20-mesh screens.

POLISHING MACHINE FOR CASTINGS AND TUBES

The machine shown in the cut, manufactured by the Wm. V. Robinson Company, Owosso, Mich., attracted a great deal of attention. The Robinson Improved Polishing Machine is adapted for polishing flat or oval castings, as well as for flat plates, which require buffing. It is also designed so that it is especially adapted for polishing pipe or tubing of any diameter and in any lengths up to six feet.

It is claimed to save from 50 to 60 per cent. in the polishing cost over the old methods of polishing by hand.

The machine is so constructed that it can be used for all kinds of flat castings or oval castings, and by changing the carriage can be used for polishing pipe. Thus, it serves the double purpose of being used for both classes of work. Or, if it is desired for but one class of work, it is equipped with but one carriage adapted for the kind of work desired. The simplicity of the construction and the ease with which the machine can be con-



ROBINSON PIPE OR TUBE POLISHING MACHINE.

trolled and operated permits the employment of unskilled labor. Circular matter relating to this machine may be had by corresponding with the Wm. V. Robinson Company, and inquiring for catalogue M.

WELDING OUTFITS

The welding outfit shown in the cut is furnished by the Dyer Apparatus Company, Boston, Mass., for use in welding, brazing, straightening, soldering and removing carbon. The equipment as shown consists of one oxygen reducing valve, one acetylene reducing valve, one torch with six tips, two ten-foot lengths of hose with connections, one lighting tank connection, two wrenches, one can cast-iron flux, one can tobin bronze flux, one pair goggles, one lot cast iron, aluminum and steel welding material, and this

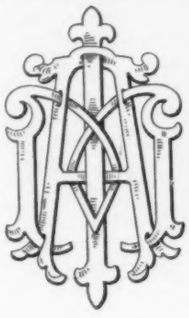
A WELDING OUTFIT FOR WELDING AND BRAZING.

comprises all that is necessary to commence welding except the gas and gas container. The Dyer Company guarantee the quality of material and workmanship, and also guarantee the outfit for welding any job that it is practical to do. These plants have been employed in foundries, boiler shops, silversmiths, sheet metal works, garages and in fact any line of work to which they may be applied. The company is anxious to furnish any additional information to any one who is interested in installing a welding or brazing outfit.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

AMERICAN INSTITUTE OF METALS



President, L. W. Olson, Mansfield, Ohio; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the Americ̣an Foundrymen's Association in a succession of cities as invited. The next convention will be held in the spring of 1914 but the location is as yet undecided.

REPORT OF THE CO-OPERATIVE WORK OF THE BUREAU OF MINES WITH THE AMERICAN INSTITUTE OF METALS.

By G. L. Parsons.

At the September, 1912, meeting of the Institute the first main problems of the non-ferrous alloy work of the bureau were stated as:

1. A comparative study of brass furnaces with particular reference to fuel efficiency and losses of metal in melting.
2. Study of the precautions to be taken for health and safety in the brass foundry.
3. The development of a suitable pyrometer for molten brass.
4. The development of an electric furnace for brass melting.

In the eleven months from that meeting to the present time progress has been made on all these problems.

H. W. Gillett has completed a comprehensive bulletin covering Problems 1 and 2 which gives over 300 sets of data on the performance of 21 distinct types of furnaces in commercial use, compiled from information received from 280 firms in 28 States and from visits to 75 foundries and rolling mills in 11 States and results are discussed with particular reference to the alloys melted, the fuels used, and the local conditions affecting the behavior of the furnaces.

The furnaces reported on include: coal, coke, oil, natural, city and producer gas-fired furnaces.

The variables affecting the design and operation of each type of furnace are discussed, the effort being to bring out the peculiar advantages or disadvantages of each form for use on different alloys. Many points worthy of further study and experiment in the effort to prevent waste in the brass foundry have come up in the preparation of the bulletin.

Methods for the utilization of waste heat from the furnaces are described, and the recovery of metal from slag, skimmings, ashes and other waste material is discussed.

The subect of health and safety of the workers in brass foundries and rolling mills has been studied at length, an account being given of the steps taken for the promotion of health and safety in various foundries, and recommendations being made as to the precautions that all foundries should observe.

The bulletin is too comprehensive to allow making in this short paper any sort of a summary of the conclusions arrived at. It will appear shortly and will be sent to each member of the Institute.

Work on the development of a practical pyrometer for molten brass is now in hand, and while the problem is not yet solved, considerable progress has been made.

J. M. Lohr has worked on the types of electric furnaces for brass melting. One type has been dropped for the present on account of numerous disadvantages, but the two forms now in use look promising. These have gone through various stages of development, and while probably not yet in their final shape, are nearly at the stage where actual service tests may be run. Progress may therefore be reported on this problem also. A great deal of work is required on such problems as the electric furnaces and the pyrometer, and as the Bureau has as yet been able to put only two men on these problems, definite results have not yet been obtained.

The Bureau wishes to express its deep appreciation of the cordial co-operation of the members of the Institute who have supplied a great deal of the data for the preparation of the bulletin on brass furnaces, and who have thrown open their plants for inspection, as well as to some who have loaned material for use in the electric furnace work.

The non-ferrous alloy work of the Bureau is being done at Cornell University, with the co-operation of Prof. W. D. Bancroft. Mr. A. B. Norton, one of Prof. Bancroft's students, has determined the melting points of some commercial brasses and bronzes, under the direction of H. W. Gillett, of the Bureau of Mines, and a paper presented at this meeting of the Institute gives the results of this work.

AMERICAN ELECTRO-PLATERS' SOCIETY

(AN EDUCATIONAL SOCIETY.)

President, Geo. B. Hogaboom, New York; Secretary, F. C. Clement, 462 North 50th St., Philadelphia. Pa. All correspondence should be addressed to the Secretary. The objects of this society are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. The society meets in convention in the spring of each year, subject to the decision of the executive committee. The next convention will be held the first week in June, 1914, at Chicago, Ill. The branch associations hold monthly and semi-monthly meetings in their various cities.

The regular monthly meeting of the New York branch was held at their rooms, 390 West 23rd street, Friday evening, October 24. Mr. Charles Phillips, of Bridgeport, Conn., was elected to membership. A committee was appointed to choose a subject for debate with the Newark branch. Mr. Bernath was given his transfer to the Chicago branch, and an interesting discussion was had on acid copper solutions. A full attendance at the next meeting, November 28, is requested, as a lively time is promised.

The October meeting of the Philadelphia Branch was held on Friday evening, October 3, at Dooner's Hotel. A lengthy discussion was held on "The Most Economical Way of Cleaning a Silver Solution." One application for membership was made. The November meeting of the Philadelphia Branch was held on Friday evening, November 7, at the plant of the Hartford Sterling Co., 48 North Sixth street, Philadelphia, Pa. Dr. Weber and Mr. Schnieder, representing the Roessler & Hasslacher Chemical Company, of New York, gave a practical demonstration of "Trisalyt" and discussed technical points on the use of "Trisalyt" and plating baths in general.

The regular meeting of the Newark Branch was held October 17. The members had an interesting discussion of brass solutions. At the November meeting gold solutions will be discussed.

The Chicago Branch have arranged with the Y. M. C. A. for lectures on chemistry and demonstrations of plating compounds at their regular meetings.

AMERICAN ELECTRO CHEMICAL SOCIETY

President, E. F. Roeber, New York; Treasurer, Pedro G. Salom; Secretary, Jos. W. Richards, Lehigh University, South Bethlehem, Pa., to whom all correspondence should be addressed. The object of the society is the advancement of electrochemistry. Meets twice a year. The XXV General Meeting will be held in New York in April, 1914.

Chairman Lawrence Addicks of the New York section announces:

"The next meeting of the section will be a joint one with the New York section of the American Institute of Mining Engineers, to be held at the Engineering Societies building, 29 West Thirty-ninth street, at 8:30 p. m. Thursday, November 20.

"The subject for the evening is: 'The Metallurgy of Zinc' and the programme is as follows: 'Progress in the Metallurgy of Zinc,' Geo. C. Stone, metallurgist, New Jersey Zinc Company; 'The Electric Smelting of Zinc Ore,' W. R. Ingalls, editor, Engineering & Mining Journal; 'The Electrolytic Refining of Zinc,' Victor Englehardt, chief engineer, Siemens-Halske Company; 20 minutes; a brief summary of the present status of electrolysis as applied to zinc and the outlook for the future.

"Following these papers there will be a general discussion of the subject, several gentlemen familiar with the question having promised to take part. As there is much conflicting opinion on the future of zinc, it is expected there will be much disorder."

ITEMS OF INTEREST TO THE INDIVIDUAL.

Hugh McPhee, formerly of the Aluminum Bronze Foundry, Tarrytown, N. Y., is now connected with the Kelly & Jones Company, Greensburg, Pa., as superintendent of their brass foundry.

W. L. Abate, formerly superintendent of the Nathan Mfg. Company, New York, is now representing the Nassau Smelting & Refining Works, of New York at Detroit, Mich. Mr. Abate's address is 912 Dime Bank Building, Detroit, Mich.

J. H. Hansjosten has severed his connection with the Bennett-O'Connell Company, Chicago, Ill., and has taken a position with the Globe Stove & Range Company, Kokomo, Ind., in the capacity of foreman of their plating and polishing department. Mr. Hansjosten's home address is 224 East Mulberry street, Kokomo, Ind.

A. G. Sherman, of Buffalo, has been appointed superintendent of the Buffalo Copper and Brass Rolling Mill in the place of John A. Fletcher, resigned. Mr. Sherman has been with the mill for some time as assistant superintendent and holds the respect and confidence of all his business associates and acquaintances.

W. O. Sheldon, formerly New York sales agent of the Buffalo Copper & Brass Rolling Mill, has recently been appointed sales manager of the company and has removed to Buffalo to take up the duties of his new position. Mr. Sheldon has been closely affiliated with the copper and brass industry in the vicinity of New York and New England for the past twenty-five years and is well qualified to assume the responsible position which he now occupies.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

NEW BRITAIN, CONN.

NOVEMBER 3, 1913.

Through the efforts of State Rivers, Harbor and Bridge Commissioner William H. Cadwell, of New Britain, the Hardware City is to acquire an important industry from New Jersey, and a point only about twenty four miles out of New York city. Mr. Cadwell is the secretary and treasurer of the Beaton & Cadwell Company, and in this capacity has successfully terminated negotiations for the acquirement of the Eagle Manufacturing Company from the McGee Supply Company, successors to the Alonzo H. McGee supply house. The Beaton & Cadwell Company also obtains this supply house.

The Eagle Manufacturing Company is a growing concern. It manufactures air valves, steam fittings, boiler fittings, etc., and its business dovetails in with the floor plate manufacturing line of the Beaton & Cadwell Company, the products of both concerns going to the same trade. The Eagle Company employs about forty hands and preparations are being made to move the entire plant to this city within the next few months. This means further expansion on the part of the Beaton & Cadwell Company, which is a growing business, and they expect to start work on a new factory building in the spring of 1914. At the present time this thriving little concern employs nearly half a hundred hands, and under the management of President A. J. Beaton it is rapidly making a name for itself in the metal manufacturing world. It has such men in its directorate as President A. F. Corbin, of the Union Manufacturing Company, who is recognized as one of New Britain's most capable manufacturers, being a brother of the late ex-Mayor George W. Corbin, for many years president of the Corbin Cabinet Lock Company, now a division of the vast American Hardware Corporation.

However, progress refuses to stop in this bustling manufacturing center with the acquisition of one new concern, and the officials of the well known American Hardware Corporation have just announced their intentions of forming another new division of their concern, to be known as the Corbin Automatic Products Company.

The new addition being erected at the Corbin Screw division will be six stories high with a basement and will be about 100 by 50 feet in size. When completed it will offer every facility for the housing of additional automatic machines required to keep pace with the rapid growth of the special parts department. That this constantly increasing volume of business may be developed along its own special lines, the American Hardware Corporation has in mind the early segregation of the coaster brakes, speedometer and special parts departments into a new division, to be known as the Corbin Automatic Produtcs Company. This new division is to be under the active management of Clarence A. Earle, who is at present in charge of the Screw and Bolt division. Mr. Earle's successor will be Charles H. Glover.

Business is rushing at Landers, Frary & Clark's, and some departments are working thirteen hours a day. The Berlin Construction Company reports night work in some of its departments, and this same rule has been in vogue at the Corbin Screw division, the P. & F. Corbin division and various departments of other concerns. While present business is rushing, President Charles F. Smith, of Landers, Frary & Clark's, was asked what he thought the outlook for the winter to be, and he stated that although he did not think that it will be as rushed at it is at present, still he does not look for any serious slump. President Smith left late this month for an extended trip through the West, his idea being to get in touch with the conditions there. —H. R. J.

WATERBURY, CONN.

NOVEMBER 3, 1913.

General dullness and a widespread uncretainty in industrial and business circles over the currency bill now before Congress is given credit for a definite slackening of the industrial pace in Naugatuck Valley metal industries during the past week. The New England Watch Company's plant, operated for several months under the management o fa receiver, has shut down for an indefinite period, laying off 216 hands and advising more than half of them to seek other positions. Its future is vague, but there is some hope of reorganization to continue the business. The court has given the company until January 1, 1914, to reorganize to continue the business.

The Chase Rolling Mills Company, Scovill Manufacturing Company, the various Waterbury plants of the American Brass Company and most of the smaller plants in the brass industries hereabouts began a five-days-a-week schedule last week, and with only about two-thirds of their usual number of hands. The Waterbury Clock Company also is on a five-day schedule. For the greater part of the winter season, some believe, this will continue.

It is not a time for pessimism, for the signs for a long period have been adverse to the continuance of the steady and very strong stream of business of prosperous proportions that the industries hereabouts have enjoyed. For two years the business of the big plants of this city has been daily surprising the heads of them, for despite the scarcity of money for borrowing and the adverse conditions in many other industries, the brass business generally has gone forward at a swinging pace with hardly a perceptible slackening outside of the seasonable changes that are always expected.

Signs for the future are not gloomy, either, but rather uncertain. John H. Goss, of the Scovill Manufacturing Company, is quoted on the situation as follows: "I don't believe the situation here will be much better until the currency bill and other measures which are now bothering Congress are settled. The currency bill has caused much perplexity, and I think that much of the present uncertainty among manufacturers and others is due to it."

The general sentiment seems to be that, with legislation that is not easily fathomed out of the way, business will resume its normal stride soon. Much depends on developments during the month of November.—F. B. F.

HARTFORD, CONN.

NOVEMBER 3, 1913.

The Pope Manufacturing Company, of Hartford, is in the hands of a receiver. Colonel George Pope, treasurer of the company, president of the National Association of Manufacturers and treasurer of the Automobile Chamber of Commerce, was named by Judge Joseph P. Tuttle on October 27 as a receiver of the company, and has furnished the $200,000 bond required. The action for the appointment of a receiver in Massachusetts was begun immediately, and the date set for the hearing is November 12.

The application for a receiver was made by the New Departure Manufacturing Company, of Bristol, and of Frederick F. Small, of West Hartford. In financial circles here the move is looked upon as one made at the instigation of the company, and intended to straighten out the tangled finances of the concern. It is believed that the Pope Manufacturing Company is solvent, but that lack of sufficient capital to run its business has hampered it in the past.

The way is now clear for Bishop White, of West Hartford, who is connected with the American Chain Company, of Bridgeport, to become absolute owner of the property of Pratt & Cady Company, the necessary court order having been issued. Mr. White will pay all the liabilities of the concern, about $506,000, and the expenses of the receiver. That the business will be continued is certain.

The property of the Hartford Foundry Company, which is in the hands of a receiver, was bid in at auction recently by the Charter Oak National Bank, holder of a $20,000 mortgage. The bid for the equity in the real estate was $1,000. The equipment brought a bid of $2,000.

General business conditions in the metal industries of Hartford are good, though the difficulty of securing money has caused several of the concerns that are somewhat weak financially no end of trouble. The manufacturers report that there seems to be a cutting down of purchases and a disposition to go slowly until currency legislation is no longer a question and the new tariff law has shown what it will do. Hartford manufacturers, as a whole, look upon the future with optimism.—A. L. M.

PROVIDENCE, R. I.

NOVEMBER 3, 1913.

Business generally among the metal trades in this city and vicinity is good, though few concerns are actually rushed. The majority of the firms have enough work or orders on hand for the present, but the outlook for the future is not so bright as could be expected. The various foundries hereabouts report plenty of work and all the concerns that are employed in the production of automobile parts or accessories are working to capacity. Conditions among the manufacturing jewelers are difficult to describe. Many of the factories are working overtime, while more of them are working along the same lines that they have been following for the past several months. What rush demand that there is, however, is not confined to any one grade of goods, but such concerns whose plants are working overtime are to be found among the manufacturers of solid gold, makers of plated and filled goods alike.

Isadore Gederman and Louis Brady are the owners of the B. & G. Sheet Metal Company, 112 Dorrance street, according to information filed at the office of the City Clerk of Providence. The plant of the American Enamel Works on Neville street, which was almost completely destroyed by fire a few months ago, is to be rebuilt, and the actual work of reconstruction has already been commenced. According to the plans the new plant will consist of a main structure, 139 ft. in length and 108 in width, with two ells, one 82 by 42 and the other 75 by 25 ft. The new buildings are to be constructed of brick and are to be equipped throughout by the latest appointments. The new plant of the R. Plews Manufacturing Company, which the concern was obliged to build on Central street, Central Falls, on account of the grade crossing improvements in that city, is now in full operation in the manufacture of tin cylinders and sheet metal work. The grounds which surround the building have been graded and sodded and granolithic sidewalks are being constructed and fences built.

The Eagle Cornice Company, Blackstone street, this city, are unusually busy, having recently secured several good contracts. Among these are the metal doors, cornice sills, etc., of the new office building and repair shop for the New Bedford Gas & Edison Electric Company; copper and metal work for the hospital building at Grafton, Mass.; metal doors and windows for the two new power houses for the Narragansett Electric Lighting Company, this city; copper and metal work for new R. L. Rose Company building, Snow street, this city, and for the new Infirmary at the Dexter Asylum, this city.

Among the heaviest tax payers in this city, according to the recently filed report of the Board of Assessors, are the following: American Screw Company, $1,708,940; American Emery Wheel Works, $63,780; Herbert J. Astle, $51,260; J. Briggs & Sons Company, $60,000; Brown & Sharpe Mfg. Company, $4,027,000; Colvin Foundry Company, $95,100; B. A. Ballou & Co., Inc., $100,000; the S. B. Champlin Company, $50,000; D. & W. Fuse Company, $211,800; Theodore W. Foster & Bro. Company, $240,360; General Fire Extinguisher Company, $576,780; Gor-

ham Manufacturing Company, $1,796,660; Hamilton & Hamilton, Jr., $100,000; Irons & Russell Company, $242,400; Improved Seamless Wire Company, $134,500; Henry A. Kirby, $76,940; Lyons Manufacturing Company, $50,000; the Metal Products Corporation, $122,060; Manchester Manufacturing Company, $55,500; Manchester-Smith Company, $76,000; Martin-Copeland Company, $60,000; Nicholson File Company, $705,880; New England Butt Company, $191,420; Ostby & Barton Company, $435,060; Phillips Lead & Supply Company, $57,000; Potter & Buffinton Company, $50,000; J. W. Richardson Company, $65,000; Roger Williams Silver Company, $50,000; Henry D. Sharpe, $821,920; Lucian Sharpe, $679,080; Sterling Improvement Company, $51,680; Stevens & Co., Inc., $78,200; John C. L. Shabeck, $78,200; United Wire & Supply Company, $135,620; Waite, Thresher Company, $277,360; A. T. Wall Company, $181,260; Wightman & Hough Company, $80,000; Dutee Wilcox, $361,320; D. Wilcox & Co., $113,700; D. M. Watkins Company, $50,000.—W. H. M.

BOSTON, MASS.

NOVEMBER 3, 1913.

Activity ranges from moderate degree to utilization of full capacity in the metal industries here, according to the line of business under consideration. The silversmiths and repairers in jewelry lines are not rushed, although they keep shop crews fairly well employed, but they have little difficulty in turning out jobs and meeting all demands within a short time after orders are placed with them, especially in the jobbing branches of the trade.

Among the workers in brass and copper there is a fairly steady business. Frank N. McIntire, of 167 Oliver street, states that the year to date has been a good one, orders keeping up well through the summer and into the current month. Makers of chandeliers and other interior fittings report similar conditions.

The Hodgdon Brass Company finds the labor cost a factor that operates to effect some curtailment of the volume of work required in special lines, as it has necessitated advances in prices of the output. Nevertheless the declaration is made by a representative of the concern that financially the year has been the best in a decade. The average customer realizes that the workmen are obtaining higher wages and working fewer hours, and pays asking prices, perhaps not cheerfully, but of necessity.

It is in the more expensive work and what may properly be considered luxuries that some falling off in the volume of production is found. On these, as on various other more essential goods, however, the margin of profit in many instances, has been advanced, following increases of wages, and the firms that keep busy do not suffer materially by the change in conditions. Whether tariff changes are to affect general business is not as yet apparent, dealers and manufacturers declare.

A pointer as to the probable effect on aluminum utensils was obtained incidentally a few days ago in an interview with Julius I. Baer, of Louis Wolf & Co., 104 Pearl street, this city, who have establishments also in New York and Chicago. They are essentially importers, and Mr. Baer said that the house is sending out revised lower price lists and obtaining large orders in response, as a direct result of a reduced duty on aluminum ware. Heavy importations, held in bond until a short time ago, are being disposed of. Mr. Baer did not venture any opinion, however, as to the bearing of the change upon domestic aluminum production.

Walter I. Cowlishaw, silversmith, has removed from Harvard Place to Washington street.—J. S. B.

ATTLEBORO, MASS.

NOVEMBER 3, 1913.

Salesmen in from long trips report only fair business, but prospects that the annual "drive" during November and December will be harder than ever. Seemingly, the retailer has waited before stocking up and now that it is assured that the Democratic tariff is not to wipe out all industry, will soon be busy stocking up. George Semple has left the W. & S. Blackinton Company, of which he was New York representative, and has accepted a similar position with Bates & Bacon Company of Attleboro.

The Paye & Baker Manufacturing Company of North Attleboro is associated with a group of Providence firms in starting a course for the training of jewelry apprentices at the Rhode Island School of Design. J. A. Sworbel, for many years a die cutter and toolmaker in Attleboro, has removed to New York.

The dissolution of partnership between L. Sweetland and Walter Murray has been announced. The firm has been doing a jewelry business under the name of Sweetland, Murray & Co., and was located on East street, North Attleboro. The business is to be continued by Mr. Sweetland, and will be removed to South Attleboro.—C. C. C.

NEWARK, N. J.

NOVEMBER 3, 1913.

The manufacturing jewelers and silversmiths have not had a good year and the holiday season is close at hand. There are more factories than there were years ago and there are more people to buy such lines. The factories have been working from 50 to 75 per cent. of the normal capacity, according to the line and quality of goods. The highest grade lines are selling as exclusive goods and the cheap articles are in strong demand among the larger class of buyers. Pearl, which is made up here in large quantities, is used to a large extent in jewelry, also the various precious and semi-precious stones and pearls. Enameling is not in demand, except some of the cloisonne enamel. Engraving has fallen off, the demand being for the cheaper engine burning.

Klatsko & Barisov moved their jewelry plant to 72 Springfield avenue.

The Universal Castor & Foundry Company have erected an addition to their plant at 574 Ferry street.

Landosky Bros. have started in as platers, metal spinning, finishing and lacquering at 24 Mechanic street.

J. L. Seaman is doing gold, silver, brass, copper, aluminum and tin spinning at 24 Mechanic street.

V. Weber has started in business at 8 Johnson street, making incubators of asbestos, having aluminum doors and side pieces, being heated by electricity. They say they have found the Vixen file the best for aluminum work, as it does clean work and gives 100 per cent. better results.

E. G. Gagel has started the art casting works at 104 Verona avenue, making silver, brass and bronze castings. He has a new process, which is a plaster composition, far superior to anything ever used in sand or other molding material. Casting can be done by this process that he says is impossible by any other. The work comes out sharp and clean, showing up all the details. This process also saves expense.—H. S.

PHILADELPHIA, PA.

NOVEMBER 3, 1913.

The business lines have not been going as strong during the past few months as was expected and are quiet at the present time. There is not much of a chance for any decided improvement this year. The brass, copper, tin, aluminum, bronze and other metals have been worked up in the factories to only a fair capacity and demand. There is considerable room for improvement. The factories working in gold, silver, German silver, platinum, etc., have had a very quiet year. The jewelers, silversmiths, watchcase makers, tool and machinery lines have not been busy as a whole, but individual cases are known where they were very busy.

The Shawnee Foundry has moved from Columbia, Pa., to Marietta, Pa. It was owned by John Schnell and made brass castings. The business increased so that larger quarters were necessary.

The Brown Instrument Company of this city have placed on the market an improved thermo-electric pyrometer to measure the temperature of molten copper, brass, bronze, aluminum and other metals.

The Titanium Alloy Manufacturing Company, of Pittsburgh, say the sale of their products will be in charge of the general manager, Andrew Thompson, with office at Niagara Falls, N. Y., and A. C. Hawley has charge of the sales at Pittsburgh in the Oliver Building.

The American Metal Company, of New York City, the largest producers of zinc in the United States, with plants in Oklahoma and Kansas, have bought 2,500 acres of Pittsburgh coal land and 350 acres at Burgettstown, Pa. They

are building there a zinc smelter and sulphuric acid plant. The American Zinc and Chemical Company has been organized to handle the business in this state and a model town will be built. N. L. Heinz, formerly with Matthiesen & Hegeler Zinc Company, of La Salle, Ill., will be the general manager. A one unit plant will be built at first, having a capacity of 40,000 tons of sulphuric acid and 20,000 tons of zinc a year. A shaft will be sunk to mine coal. The initial plant will cost $2,000,000, but will eventually cost $5,000,000. Dr. Otto Sussman is the engineer in charge.—H. S.

LOUISVILLE, KY.

NOVEMBER 3, 1913.

Business has been booming lately among the coppersmiths in this section, on account of the somewhat belated demands of the distillers for equipment, and for repairs to old equipment. The various rumors regarding a material curtailment of the whisky crop as a result of the high price of corn had resulted in a tendency to await developments on the part of numerous small distillers, but these have waked up lately, and come to the conclusion that if there is any curtailment, it can come just as well at the end as at the beginning of the season. In consequence things are very active among the several concerns in Louisville which specialize on distillery equipment and supplies, and the volume of business will probably be of normal proportions.

Matt Corcoran, Jr., of Matt Corcoran & Company, is with the crew from the plant which left several weeks ago for a point in the province of Ontario for the purpose of installing additions to the Corby distillery, one of the largest in Canada. Business is active with the Corcoran plant, the demand noted by the coppersmiths for distillery equipment being general.

W. P. Davis, a well-known dealer in metals in Louisville, covered a number of Southern cities in his territory recently, finding conditions satisfactory and the demand good.

The Rindt Company, which succeeded the Art Brass & Plating Works, is manufacturing the patent reversible sad-iron, which uses gasoline as a fuel, which is its principal product. The company is also working on an iron to use gas, either natural or artificial, as a fuel. Notice was recently given of the formal dissolution, by consent of the stockholders, of the Art Brass & Plating Company.

Hines & Ritchey, Louisville coppersmiths, are handling a large volume of work for the Rugby Distillery Company and the Old Grand Dad Distillery Company, both of which plants are near Louisville. The demand for equipment is becoming very active as the date for the opening of the distilling season approaches, many rye distillers in the East coming to this market for their supplies.

The Henry L. Koehler Manufacturing Company recently moved its metal tag and stamping plant from 443 Center street to Jones and N streets, using the building formerly occupied by the Louisville Bolt & Iron Works. The company has put in considerable new machinery in order to accommodate its growing business, and is handling about three times the volume of work formerly turned out, according to Superintendent Goepper.

Avery H. Reed, a mining engineer at Marion, Ky., which is the center of the district in which fluorspar is mined, is planning the erection of a large mill for cleaning and grinding spar. Lead and zinc ores will also be treated at the plant, which will have a large tonnage.—G. D. C., Jr.

COLUMBUS, OHIO

NOVEMBER 3, 1913.

The metal market in Columbus and central Ohio is rather quiet in every way. The adoption of the tariff bill which will affect prices on practically all metals is one of the chief causes for the quietude, although there are other causes helping to make the demand quiet. No new metal using concerns have been started in this territory.

Auto and brass concerns are fairly busy, as the auto repairing season is not yet over. There is also considerable activity in the auto lamp manufacturing business, which is represented by one large concern in the John W. Brown Manufacturing Company. Brazing and welding concerns are fairly active.

Taking it all in all, the market is as active as could be expected under the circumstances. Factories are loath to increase their stocks of materials to any great extent, fearing that the readjustment incidental to the tariff will affect them adversely.

The copper market is firm in most respects, with scrap in crucible shape selling for 15½ cents to the trade. Brass is also holding up well under the circumstances. Red scrap brass is sold at 13¾ to the trade and yellow brass scraps at 10 to 10½ cents.

The aluminum market is dead and it is difficult to secure quotations because of the tariff. Prices are unsettled and the movement is small. Babbitt metal is in good demand as printing is slowly but surely improving in this section.

The Metal Welding and Brazing Works is the name of a new auto repair shop located at 75 East Mound street, Columbus, Ohio.

B. M. Huffman, of Newark, Ohio, has embarked in business for himself, having secured the plating equipment formerly used by the Newark Rifle Works, before the metal department moved to Cleveland. He has remodeled it and is able to do electroplating of all kinds.—J. W. L.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Great Northern Plating Works, Chicago, Ill., have purchased the building on Ogden and Campbell avenues, and will occupy same after January 1. The building covers an area of 66,000 sq. ft., and will be used for the manufacture of metal furniture and all kinds of electro-plating.

The American Pin Company, Waterbury, Conn., are planning the erection of a building 250 x 50 ft., to be used for shipping and in order to enable them to increase their facilities for manufacturing their brass goods products. They also have a brass foundry, plating room and metal working departments.

The Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y., have just completed an extensive and well equipped addition to their mill, which is to be used as a mess hall and coat room for their employees. They are also extending their tinning and pickling departments to take care of their increased production.

The Unique Brass Foundry Company, Buffalo, N. Y., have purchased a site at Grant street and the New York Central Railroad and have started the erection of a plant 50 x 150 ft. At present they only have a first class brass foundry. A specialty will be made of manganese, red and yellow bronze, copper and aluminum castings.

J. Schwarzwalder & Sons, Inc., 15th and Jefferson streets, Hoboken, N. J., who are among the oldest and largest manufacturers of wooden tanks, vats, etc., announce that they make a specialty of tanks for platers, galvanizers, bleachers, dyers and manufacturers and users of all kinds of chemicals. They furnish the tanks lined with lead or pitch as desired.

The Bristol Company, Waterbury, Conn., has taken over the business of the Goodwin Hollow Set Screw Company and have made arrangements for the exclusive manufacture of the Goodwin Patent Hollow Safety Set Screws with the dove-tailed slots. Better facilities for manufacturing these set screws will be provided and shipments are already being made from the main factory of the Bristol company.

The Two-Rivers Aluminum Company, Two Rivers, Wis., will erect an addition 40 x 200 ft. to its plant early next Spring. The foundation for the building is being prepared now. The company has also just completed two new buildings made necessary by the increasing business. They are installing a 500 horse power steam turbine to run the factory plant besides a 300 horse power engine to run other departments.

L. Vogelstein & Company, agents of Aron Hirsch & Sohn, Halberstadt, Germany, report imports of copper into Germany from January 1 to August 1, 1913, 134,293 tons, 6,010 tons of which were exported, leaving the apparent consumption in Germany 128,283 tons, against deliveries during the corresponding time in 1912, of 120,071 tons. Of the total imports, 115,349 tons came from the United States.

The U. S. Reduction Company, of Chicago, Ill., have, after experimenting for several years, succeeded in obtaining a mixture that will successfully reduce to a marked degree the oxidation of zinc. This mixture is now being placed on the market under the trade name of "Noxide," and it is stated by the company that it has been thoroughly tested and its practicability has been proven beyond the question of a doubt.

The Aluminum Goods Manufacturing Company, Manitowoc, Wis., have just completed their new building at Manitowoc and are building at their Two Rivers, Wis., factory. The company expect that by May 1, 1914, their output will be doubled. They employ in their three factories the following number of hands: Manitowoc, 450; Two Rivers, 200, and Newark, 150. The company has also purchased a city block in Newark, N. J., where they expect to erect a new plant beginning sometime next year.

Samuel B. Myers has sold his interest in the Gerline-Myers Brass Foundry Company, Kalamazoo, Mich., and has resigned his position as secretary and treasurer of same.

Seymour H. Franklin has been elected to fill the vacancy, and the officers at present are as follows: Samuel Franklin, president; Otto Gerline, vice-president and general manager, and Seymour H. Franklin, secretary and treasurer. The name of the firm has been changed to the Gerline Brass Foundry Company.

The Celluloid Zapon Company is making extensive additions to their Stamford, Conn., factory. The building now used for lacquer mixing and storage is being duplicated so as to double their present capacity. The plant erected two years ago for making soluble cotton is being enlarged to give three times their present output. Construction throughout is brick and concrete in accordance with the most up-to-date practice. It has been nine years since this company built their Stamford factory, and three times they have been compelled to enlarge it to take care of their constantly increasing business.

All exhibits destined to the Panama-California Exposition, to he held in San Diego from January 1 to December 31, 1915, forwarded from points in the territories covered by the Pacific Freight Tariff Bureau, the Trans-Continental Freight Bureau, the New England Freight Association, the Trunk Line Association (including points in Canada located east of Toronto, Ontario) and the Central Freight Association (including points in Canada, Toronto, Ontario and west thereof) on which full tariff rates are paid coming to the exposition, will be returned carriage free, except race horses and vehicles (including automobiles for racing purposes exhibited at this exposition), goods to be returned by the routes that originally carried and offered for return transportation ninety days after the close of the exposition.

The Mount Carmel Brass Foundry Company, Inc., Mount Carmel, Conn., which was recently organized, is a new concern and composed mostly of former employees of the Waterbury Mfg. Company, Waterbury, Conn. Most all of the stockholders are practical foundry men. The concern intends to start in with the production of brass and bronze castings for the plumbing trade mostly, but does not want to specialize on them particularly. Every kind of work will be accepted that can be done without machining and finishing. They have no metal working shop or plating room connected with the foundry as yet. The foundry is equipped with twelve furnaces and run by experienced men. The company states that prompt and efficient service will be given to all customers.

The published report that the W. J. Baker Company, Newport, Ky., had acquired the plant of the J. M. Robinson Manufacturing Company, of Cincinnati, O., is stated to be erroneous. The W. J. Baker Company has purchased only that part of the J. M. Robinson Manufacturing Company that is known as the stamping department, such as dies and presses used on stamping and making sheet metal specialties. The Baker Company have been large manufacturers of sheet metal stampings for years, and have merely taken over this part of the J. M. Robinson Manufacturing Company business. The J. M. Robinson Manufacturing Company will continue to manufacture as before presses, dies, cornice presses and brakes, shears and special machinery for sheet metal.

The National Company, Waterbury, Conn., which will manufacture seamless brass and copper tubing, has awarded the contract for its building, 70 x 100 feet, one story high. The building, upon which the contractors have already started, is to be constructed of steel, cement and brick, of as nearly fireproof material as the most modern engineering skill can advise. The building will have a floor space free of pillars and other obstructions with a ceiling height of 18 feet. The company will use electric power and will furnish their own water supply for all purposes by a well to be driven within the factory building. It is the purpose of the owners to make their factory buildings model ones. The company owns nearly ten acres with a railroad frontage of about 600 feet, a highway frontage of about 850 feet, and is bounded on one side by a stream with a never-failing supply of water.

A NEW STOVE PLANT

Ground was broken on Wednesday, October 15, and work started on the new plant of the Perfection Stove Company, Sarnia, Ont., an adjunct of the Standard Oil Company, and which will be the second most important industry in Sarnia. They have purchased ten acres of land from the H. Mueller Mfg. Co., brass goods manufacturers, adjoining their new Canadian plant. The concern will manufacture oil stoves and all manner of oil burning apparatus. The main building will be 200 by 300 feet, and an up-to-date polishing and plating equipment will be installed. The excavating and foundation work will be rushed, and the management expects to have most of the buildings completed before cold weather sets in. It is an ideal factory location and the city is to furnish ample water and sewer facilities. The company will employ 250 men at the start and increase to 500.

INCREASE OF CAPITAL STOCK

The Globe Brass Manufacturing Company, Cleveland, O., have increased their capital stock from $50,000 to $65,000.

FIRE

The New York Buff Company experienced a fire on October 24 at 3 o'clock, when a terrific explosion occurred in the building above their floor and a fire broke out whereby they were somewhat damaged with water. They announce to the trade that they are temporarily located at No. 215 Canal street, and trust within the course of a few days to be able to resume serving to the trade as heretofore.

REMOVAL

The Quigley Furnace & Foundry Company have moved their general sales and engineering offices from Springfield, Mass., to 105 West Fortieth street, New York. All correspondence should be sent to the new address. This company builds powdered coal, gas and coal burning equipment, annealing, heating, forging and melting furnaces, soaking pits, core and mold drying ovens, open hearth steel, malleable and gray iron melting furnaces, etc. Their foundry is equipped to produce heavy gray iron castings, such as required for machine tools, engine bases and cylinders, hydraulic and intricate work.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

To manufacture marine plumbing fixtures, E. F. Howell Manufacturing Company, Westwood, N. Y. Incorporators: Elmer F. Howell, H. D. Howell.

SALE OF NAVAL MATERIAL

There will be sold at the Naval Training Station, Newport, R. I., material belonging to the Navy, condemned as unfit for use therein, consisting of scrap metal, scrap brass, copper kettles, sheet steel, empty cartridge shells, kitchen ranges, sterilizer, furniture, etc. The sale will be for cash to the highest bidder by sealed proposals to be opened at 10 a. m., November 12, 1913. Schedules containing form of proposals and terms of sale can be obtained upon application to the General Storekeeper, Naval Training Station, Newport, R. I.

FOREIGN TRADE OPPORTUNITIES

[In applying for addresses at Bureau of Foreign and Domestic Commerce, Washington, D. C., refer to file number.]

No. 11793. Caustic soda.—A business association in the United Kingdom informs an American consular officer that it has received inquiries through its offices on the Continent for a considerable quantity of caustic soda, amounting probably to several hundreds of tons. The company would like to secure the names of firms manufacturing this product in the United States with a view to supplying the needs of its European office.

No. 11838. Machine tools, etc.—An American consul has forwarded a copy of a letter from an association in his district stating that at present it is forced to import American machine tools, etc., through middlemen without any guarantee as to the fulfillment of contracts. This association desires to form direct connections with American manufacturers for supplying its needs and feels sure that such arrangements will be mutually beneficial.

No. 11842. Leather belting.—A European contractor informs an American consulate that he desires to correspond with an American firm with a view to securing supplies of leather belting. He will not trade f. o. b. New York, but has no objection to cash against documents at his bank, or any bank in his city. Ample references will be supplied if required. Correspondence should be in German.

No. 11847. Boiler and brass fittings.—A firm in a European city holding a contract to supply a government with boiler and brass fittings, including valves, faucets, etc., desires to correspond with American firms manufacturing them. Ample bank references will be given when required. The American consul who furnished this information adds that correspondence should be in German.

No. 11859. Chemicals and minerals.—A report from an American consular officer in the United Kingdom states that a firm of chemical manufacturers and merchants in his district is desirous of entering into negotiations with American manufacturers for the purchase of the following articles, of which it states that it is a large buyer: Acetic acid, lithopone, arsenic, witherite, bleaching powder, sulphur chloride, acetone oil, salammoniac, manganese, antimony, barium carbonate, barium chloride, alum, soda hyposulphate, sodium sulphide, colors and oxides of all kinds, zinc chloride, zinc oxide and magnesia. In making this inquiry the firm indicates that it cares to deal only with producers and not with merchants or brokers. The firm also desires correspondence with exporters of fluorspar, feldspar, quartz, flint and kieselguhr.

PRINTED MATTER

Anodes.—The Apothecaries Hall Company, 18 Benedict street, Waterbury, Conn., are sending out a circular setting forth their ability to make especially favorable contracts on a yearly basis for all kinds of anodes and all sorts of chemicals used by platers and manufacturers. Consumers may secure quotations by sending to this company an estimate of their 1914 requirements.

Trisalyt.—The fourth edition of the booklet on electro-plating with Trisalyt has just been issued by the Roessler & Hasslacher Chemical Company, New York. To this booklet has been added a formula for a solution for salt water gilding, in which gold Trisalyt is used. Copies of this little booklet may be had upon request.

Testing Machinery.—Riehle Bros., Testing Machine Company, Philadelphia, Pa., have sent out a letter in which they state that their catalog publications now number nine and have a weight of three pounds of printed matter. In order to obviate the annoyance caused their patrons by a large amount of matter in which they have no interest, the company are asking their customers to select what interests them from a submitted list.

Crucible Tongs.—E. R. Klemm, 1447-1455 Austin avenue, Chicago, Ill., is sending out circulars describing his cast iron crucible form, which makes it convenient for metal molders to have to fit their crucible tongs on and thus avoid unnecessary delay and expense by sending the tongs outside of the shop. Mr. Klemm also manufactures an improved form of crucible tongs which fit crucibles in sizes from forty to one hundred and fifty. Copies of the circular, which gives prices, may be had upon request.

Welding and Cutting Apparatus.—The Davis-Bournonville Company, New York, describe in a comprehensive booklet of thirty odd pages their extensive line of oxy-acetylene welding and cutting apparatus. The booklet gives full illustrations and descriptions of the Davis Pressure Acetylene Generator, portable equipment, naval equipment for acetylene generating and compressing plants and the Davis-Bournonville welding and cutting torches. Copies may be had upon request.

Foundry Equipment.—The Whiting Foundry Equipment Company, Harvey, Ill., have issued a new catalog, No. 106, giving complete illustrations and description of their side-blow steel converter. Also a catalog No. 104, describing the Watters' quick detachable grab bucket. Other products manufactured by this concern are cranes of every type and capacity and in fact everything in the way of foundry equipment necessary for complete foundry plants. Copies of these catalogs will be sent upon request.

Welding Apparatus.—In a catalog recently issued by the C. & C. Electric & Mfg. Company, of Garwood, N. J., entitled "Electric Arc Welding Apparatus," a complete description is given of their new multiple unit arc welding outfit, by means of which several operators can work from the same machine and use either graphite or metallic electrodes and perform all kinds of welding operations by means of the electric arc. Copies of this catalog will be sent to those interested.

Foundry Supplies.—Frederic B. Stevens, dealer in foundry supplies, Detroit, Mich., has issued a clever little booklet giving a description of the various materials manufactured by him. Among the supplies enumerated are Steven's pure plumbago, Columbia parting, carbon blacking, stoppers, King Kore Kompound and cost cutters. Mr. Stevens manufactures buffing compositions and platers' supplies and keeps in stock electric generators, polishing and buffing wheels, etc. Write him for a catalog of his various products which he handles.

Air Brushes.—The Eclipse Air Brush & Combination Company, Newark, N. J., have issued a twenty page catalog giving full description of the Eclipse air brush. These air brushes are claimed to be the only ones made that have successfully solved the problem of low pressure, which results in the saving of materials. The low pressure system is also under the control of the operator and can be regulated according to the article painted. The Eclipse Company will finish samples and furnish estimate of cost of time, labor, materials and workmanship without charge. Copies of the booklet will be sent free upon request.

Hardware Products.—The Imperial Brass Mfg. Co., Chicago, Ill., have issued catalog No. 50, which gives a full description of their line of handsome hardware specialties. This line includes brass and bronze kick plates, grab and push bars and door guards, brass and bronze thresholds, cast brass legs, stall standards, locks, buts, bolts and a number of automobile specialties made of brass. A special catalog, No. 70, is also issued descriptive of automobile accessories. These catalogs may be obtained upon request.

METAL MARKET REVIEW

NEW YORK, November 3, 1913.

COPPER.

The demand for copper during October was anything but brisk, and after the active buying early in September, the present lull in the market is only natural.

London standard copper has been weak and unsettled, and the decline in that market had a demoralizing effect on consumers. At the same time business generally has been more or less slow and unsettled and buyers did not come into the market for their later requirements.

Towards the close of the month there is more disposition to buy, the sales to Europe have been quite heavy and the price of standard copper in London advanced but closed weaker.

Statistically the market is in good shape, the home stocks, according to the Copper Producer's figures, decreased some 8 million pounds in September, and the European stocks for the first half of October decreased nearly 2 million pounds, so that the total visible supply of copper in the world to-day is down to very small figures.

The larger selling agents have stuck to their price of 16⅞ delivered for Electrolytic all through the month, but the demand was so slow and the London market weak that dealers and second hands were for a time free sellers at as low as 16⅜—16½ cash, when the London market was weakest. Today the market is quotable at 16¾ to 16⅞ for Electrolytic, with Lake obtainable in carload lots at 17 cents, with C. & H. bringing 17¼ to ⅜.

TIN.

The Tin market has been more or less weak and unsettled the entire month. Prices reacted at times and then a slump carried values to a lower level, and to-day the market is over two cents per pound lower than a month ago. Closing at around 40 cents for November and December delivery in 5-10 ton lots.

LEAD.

The Trust price has been cut from 4¾ cents early in October to 4.35 New York basis to-day. The change in duty may have been responsible for the cut, but it is hardly likely foreign lead will get into the United States in any quantity. To-day the market is 4.30 to 4.35 New York, and 4.15 to 4.20 East St. Louis.

SPELTER.

The spelter market has had a further slump, and after selling off to close to 5 cents, the market is a little firmer and the metal today is quotable at 5.40 to 5.50 New York, 5.20 to 5.25 East St. Louis.

Sheet zinc has been reduced to 7½ at mill.

ALUMINUM.

The aluminum market has been easier at around 19¾ to 20 cents, with foreign aluminum quoted at 18 cents in bond. Business very dull.

ANTIMONY.

Cookson's is quoted at 7½, Hallett's at 7¼ and Hungarian grade at 6⅞. Prices are about half a cent lower than a month ago, and the market is very dull.

SILVER.

The silver prices during the month have ruled rather lower, the New York market is quotable at 59⅜, with London 27⅞d.

QUICKSILVER.

The wholesale price is $1 per flask lower than a month ago and is quoted at $38 in lots of 100 flasks, with jobbing lots quotable at $39 to $40 according to quantity.

PLATINUM.

Prices are unchanged, with hard quoted at $50 and ordinary refined $44 to $44.50.

SHEET METALS.

Prices for sheet copper are unchanged at 22 cents base, with wire quoted at 17¾ cents base. High sheet brass, wholesale, 16 cents base.

OLD METALS.

Market has been very dull, but with the advance of standard copper in London and a rather firmer market here prices hold fairly steady, while metal scraps are dull and easier.—J. J. A.

OCTOBER MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	17.25	16.90	17.00
Electrolytic	16.75	16.25	16.56
Casting	16.50	16.15	16.35
TIN	41.15	39.95	40.60
LEAD	4.70	4.35	4.50
SPELTER	5.65	5.35	5.50
ANTIMONY (Hallett's)	7.85	7.15	7.55
SILVER	61.50	59.50	60.75

WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.

1912—Average for year, 16.70. 1913—January, 17; February, 15.50; March, 15⅛; April, 15.75; May, 15⅞; June, 15⅜; July, 14¾; August, 15⅝; September, 16⅞; October, 16⅞.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

September copper figures which were omitted from October because of date of issue. October and November figures will be published in December.

		Pounds.
		October 8, 1913.
Stocks of marketable copper of all kinds on hand at all points in the United States, September 1, 1913		38,314,037
Production of marketable copper in the United States from all domestic and foreign sources during September, 1913		131,401,229
Deliveries:		
For domestic consumption	66,836,897	
For export	73,085,275	
		139,922,172
Stocks of marketable copper of all kinds on hand at all points in the United States, October 1, 1913.		
Stocks decreased during the month of September		8,520,943

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

Metal Prices, November 3, 1913

METAL PRICES.

	Price per lb. Cents.
COPPER—PIG AND INGOT AND OLD COPPER. Duty Free. Manufactured 5 per centum.	
Lake; carload lots, nominal	17.25
Electrolytic, carloads lots	16.75
Castings, carload lots	16.63
TIN—Duty Free.	
Straits of Malacca, carload lots	40.00
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 25%. Pig lead, carload lots	4.35
SPELTER—Duty 15%. Sheets, 15%.	
Western, carload lots	5.50
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	24.00
100 lb. lots, f. o. b. factory	22.00
Ton lots, f. o. b. factory	20.00
ANTIMONY—Duty free.	
Cookson's cask lots, nominal	7.60
Hallett's cask lots	7.35
Hungarian grade	6.40
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	40 to .45
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL—Duty 10%	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25% ad valorem (100 lb. lots)	1.50
BISMUTH—Duty free	2.00
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty free	.98
QUICKSILVER—Duty 10%	.53
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	45.50
SILVER—Government assay bars—Duty free	.59⅜

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% ..... according to quantity	27 to 32
Silicon Copper, 20% ..... " "	34 to 36
Silicon Copper, 30% guaranteed " "	36 to 38
Phosphor Copper, guaranteed. 15% "	22½ to 28½
Phosphor Copper, guaranteed 10% "	23 to 27
Manganese Copper, 25% ..... " "	25 to 29
Phosphor Tin, guaranteed 5%. " "	61 to 63
Phosphor Tin, no guarantee.. " "	45 to 48
Brass Ingot, Yellow ..... " "	11⅛ to 12⅝
Brass Ingot, Red ..... " "	15⅛ to 15⅝
Bronze Ingot ..... " "	15 to 15½
Manganese Bronze ..... " "	18½ to 20
Phosphor Bronze ..... " "	20 to 23
Casting Aluminum Alloys.... " "	18 to 21

PHOSPHORUS—Duty free.

According to quantity	30	to 35

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
14.00 to 14.25	Heavy Cut Copper	15.25 to 15.50
13.75 to 14.00	Copper Wire	15.00 to 15.25
12.50 to 12.75	Light Copper	13.75 to 14.00
11.75 to 12.25	Heavy Mach. Comp.	13.75 to 14.00
8.75 to 9.00	Heavy Brass	9.75 to 10.00
7.25 to 7.50	Light Brass	8.50 to 8.75
7.50 to 8.00	No. 1 Yellow Brass Turnings	9.25 to 9 50
11.00 to 11.50	No. 1 Comp. Turnings	12.00 to 12.50
3.75 to ——	Heavy Lead	—— to 4.10
3.75 to ——	Zinc Scrap	4.40 to 4.50
6.00 to 7.00	Scrap Aluminum Turnings	8.00 to 9.00
12.00 to 13.00	Scrap Aluminum, cast, alloyed	14.00 to 15.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 17.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

PRICES OF SHEET COPPER.

BASE PRICE, 22 Cents per Lb. Net.

Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
	SIZE OF SHEETS.	Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 3c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC—Duty, sheet, 15%.	Cents per lb.
Carload lots, standard sizes and gauges, at mill	7.50 less 8%
Casks, jobbers' prices	8½c.
Open casks, jobbers' prices	8c.

Metal Prices, November 3, 1913

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect September 15, 1913, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.16	$0.18	$0.19¾
Wire	.15¾	.18	.19¾
Rod	.15¾	.18¾	.20¾
Brazed tubing	.20¾	—	.24½
Open seam tubing	.20¾	—	.24½
Angles and channels—plain	.20¾	—	.24½

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.17¼	$0.19¼	$0.21
Wire	.17	.19¼	.21
Rod	.17	.20	.22
Brazed tubing	.21⅞	—	.25¾
Open seam tubing	.21⅞	—	.25¾
Angles and channels—plain	.21⅞	—	.25¾

Net extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

17¾c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	22½c. per lb. base
100 lbs. to 300 lbs. in one order	23c. " " "
Less than 100 lbs. in one order	24½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 20c. per lb.
Seamless Copper Tubing, 24c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	28	27	22	21	20	20	20	20	20	20	20	21	22	24	26	27

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 50%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	19c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	16c.	" "
" " " Rectangular sheets other than Sheathing	18½c.	" "
" " " Rod	16c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 26¼c. net.
German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.
Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin.—Not over 18 in. in width or thinner than No. 26 B. S. Gauge, 5c. above price of pig tin in same quantity. Prices of greater width and thinner gauges on request.

No. 1 Britannia Metal.—Not over 18 in. in width or thinner than No. 26 B. & S. Gauge .2c. above price of pig tin in same quantity. Prices of greater width and thinner gauges on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	500 lbs.	50 lbs.	Less than 50 lbs.
20 and heavier	3-30	33c.	34c.	36c.	38c.
	3-30	34c.	35c.	37c.	39c.
21 to 24 inclusive	30-48	36c.	37c.	39c.	41c.
	48-60	39c.	40c.	42c.	44c.
25 and 26	3-30	35c.	36c.	38c.	40c.
	30-48	37c.	38c.	40c.	42c.
27	3-30	36c.	37c.	39c.	41c.
	30-48	39c.	40c.	42c.	44c.
28	3-30	37c.	38c.	40c.	42c.
	30-48	40c.	41c.	43c.	45c.
29	3-30	38c.	39c.	41c.	43c.
	30-48	42c.	43c.	45c.	47c.
30	3-30	39c.	40c.	42c.	44c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. Charges made for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 24 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	19	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	22	22	20	20	20	20	26	30	36
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb.	33	33½	33½	34	34½	35	35½	36	37	38	39	44	47

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4 per cent.	to No.	19,	B. & S.	Gauge, inclusive	$0.60
6 "	"	19,	"	"	.70
9 "	"	19,	"	"	.85
12 "	"	19,	"	"	1.00
15 "	"	19,	"	"	1.15
16 "	"	19,	"	"	1.20
18 "	"	19,	"	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.
For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.
Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.